BRITISH
(NATURAL
30 MAR 1989
PRESENTED
GENERAL LIBRARY

Bulletin of the British Museum (Natural History)

Corydalis (Papaveraceae: Fumarioideae) in Nepal

Magnus Lidén

Botany series Vol 18 No 6 30 March 1989

SHOUT
SHARE
IT

The *Bulletin of the British Museum (Natural History)*, instituted in 1949, is issued in four scientific series, Botany, Entomology, Geology (incorporating Mineralogy) and Zoology, and an Historical series.

Papers in the *Bulletin* are primarily the results of research carried out on the unique and ever-growing collections of the Museum, both by the scientific staff of the Museum and by specialists from elsewhere who make use of the Museum's resources. Many of the papers are works of reference that will remain indispensable for years to come.

Parts are published at irregular intervals as they become ready, each is complete in itself, available separately, and individually priced. Volumes contain about 300 pages and several volumes may appear within a calendar year. Subscriptions may be placed for one or more of the series on either an Annual or Per Volume basis. Prices vary according to the contents of the individual parts. Orders and enquiries should be sent to:

Publication Sales,
British Museum (Natural History),
Cromwell Road,
London SW7 5BD,
England.

World List abbreviation: *Bull. Br. Mus. nat. Hist.* (Bot.)

© British Museum (Natural History), 1989

The Botany series is edited in the Museum's Department of Botany
Keeper of Botany: Mr J. F. M. Cannon
Editor of Bulletin: Mr J. R. Laundon
Assistant Editors: Dr A. J. Harrington and Miss M. J. Short

ISBN 0 565 08024 5
ISSN 0068–2292

British Museum (Natural History)
Cromwell Road
London SW7 5BD

Botany series
Vol **18** No 6 pp 479–538

Issued 30 March 1989

BRITISH MUSEUM
(NATURAL HISTORY)
30 MAR 1989
PRESENTED
GENERAL LIBRARY

Corydalis (Papaveraceae: Fumarioideae) in Nepal

Magnus Lidén
Department of Systematic Botany, Carl Skottsbergs gata 22, 413 19 Göteborg, Sweden

Contents

Synopsis 479
Introduction 479
Materials and methods 479
Systematic summary 480
Patterns of distribution 480
Life forms and ecology 481
Key to the species 482
Revision of the species 484
Acknowledgements 536
References 536
Index 537

Synopsis

The genus *Corydalis* DC. in Nepal is revised. 44 species are recognized, 12 of which are known only from Nepal. A new section (sect. *Mucroniferae* Fedde ex Lidén) and ten new species are described: *C. lowndesii*, *C. simplex*, *C. shakyae*, *C. uncinata*, *C. uncinatella*, *C. terracina*, *C. stipulata*, *C. spicata*, *C. calycina*, and *C. pseudolongipes*. *C. elegans* subsp. *robusta* is recognized as a new subspecies.

Introduction

During the last three decades large collections of plants have been made in Nepal by European, Nepalese, and Japanese botanists, setting the basis for the momentous work *An enumeration of the flowering plants of Nepal* (Hara et al., 1978–82). However, many genera, including *Corydalis*, have not been thoroughly studied.

Corydalis DC. is a large genus of about 300 species, only parts of which have been revised, and only on a regional basis (Michalkova, 1981, 1982; Ownbey, 1947). For the Himalayan representatives no comprehensive treatise has appeared since Prain's revision of the Indian species (1896). Frank Ludlow devoted much of his later years to a study of the Himalayan *Corydalis*, and several new species were posthumously published (Ludlow & Stearn, 1975). Recently D. G. Long (1984) revised the species occurring in Bhutan and Sikkim, and added *C. cavei* to the flora of Nepal. The contributions of Wu et al. (1980, etc.) and Jafri (1974), from west China and Pakistan respectively, are also relevant.

Compared with Whitmore's checklist (*in* Hara & Williams, 1979) twenty-one species (including five name changes) are added in the present treatise, while nine names are excluded or put in synonymy.

Materials and methods

The study is based chiefly on herbarium studies, where the collections of BM and KATH form the major parts. During a trip to Nepal in 1985 I saw several species in the field and collected some live material.

All collections studied are cited by their collector, number, and location. *Polunin*, *Sykes & Williams* and *Stainton*, *Sykes & Williams* are abbreviated as *PSW* and *SSW* respectively. My own observations (from the Annapurna area, and the region between Trisuli and Poykotang

SE. of Ganesh Himal) are briefly given in quotations at the end of the distribution. All cited specimens have been seen by me, unless the contrary is indicated. Distribution maps are presented for all taxa, and distributions outside Nepal are briefly summarized. Shaded drawings were made from fresh flowers, contour drawings from resoftened flowers.

Systematic summary

CORYDALIS DC.

in Lamarck & De Candolle, 1805: 637, nom. cons. Type species: *C. solida* (L.) Clairville.

Herbs. Leaves ternately to pinnately divided, alternate or rarely opposite. Flowers zygomorphic, in bracteate racemes. Sepals petaloid, caducous. Upper petal spurred. Inner petals coherent at tip, flexible. Stamens two, each with a central dithecal and two lateral monothecal anthers. Upper stamen with a nectary protruding into the spur of the upper petal. Fruit a usually many-seeded capsule with black seeds carrying elaiosomes.

The genus can be subdivided into about twenty sections, seven of which are represented in Nepal:

1. *Leonticoides* is an Irano-Turanian section of tuberous plants. One species in Nepal.
2. *Fasciculatae* is probably the largest section in the genus, distributed in Himalaya, east Tibet, and west China. Seven species in Nepal.
3. *Hamatae* is a small group confined to high mountains in Tibet and west China. One species in Nepal.
4. *Capnogorium* comprises rosulate perennials and is especially important in west Himalaya and Tibet. It is not clearly delimited from the following sections. Seventeen species in Nepal.
5. *Mucroniferae* consists of dwarf high alpine species, some of which have a wide distribution on the Tibetan plateau (Wu & Shu, 1980). Three Nepalese species are provisionally placed here, following Wu & Shu (1980).
6. *Ramoso-sibiricae* is widely distributed in temperate Asia with disjunct occurrences in eastern Europe and East Africa. Many species of unknown affinities are often lumped together in this section. Twelve species in Nepal.
7. *Asterostigmata* includes pink-flowered species from south central China and east Himalaya. One species in Nepal.
8. *Strictae* is a central Asiatic and Tibetan section with largely xerophytic taxa. Two representatives in Nepal, both widespread in western Tibet.

Patterns of distribution

The distribution of the Nepalese *Corydalis* is fairly congruent with Dobremez' (1972) subdivision of Nepal into four phytogeographical regions (east, central, west, and northwest/Tibetan), and with Stainton's (1972) more detailed ecologically oriented scheme. Some Tibetan species occur in Stainton's 'inner valleys' as well as in Dobremez' Tibetan division.

Of the western endemic (or nearly endemic) species, seven are described here, and the remaining two were described by Ludlow & Stearn as recently as 1975. West Nepal is perhaps still the most rewarding area to hunt for new species.

The taxa can be roughly distributed under the following phytogeographical headings:

1. Western taxa that do not extend beyond the Jumla area: *C. diphylla*, *C. nana*, *C. elegans* subsp. *elegans*, *C. shakyae*, and *C. vaginans*.
2. Western taxa reaching the Arun valley: *C. govaniana*.
3. Western endemics: *C. pseudojuncea*, *C. elegans* subsp. *robusta*, *C. simplex*, *C. uncinata*, *C. uncinatella*, *C. clavibracteata*, *C. spicata*, and *C. calycina*.
4. Tibetan species: *C. conspersa*, *C. hendersonii*, *C. hookeri*, *C. stricta*, and *C. flabellata* (*C. uncinata* may also belong here).
5. Species endemic to central Nepal, or most of Nepal: *C. lowndesii*, *C. terracina*, *C. stipulata*, *C. megacalyx*, and *C. longipes*.

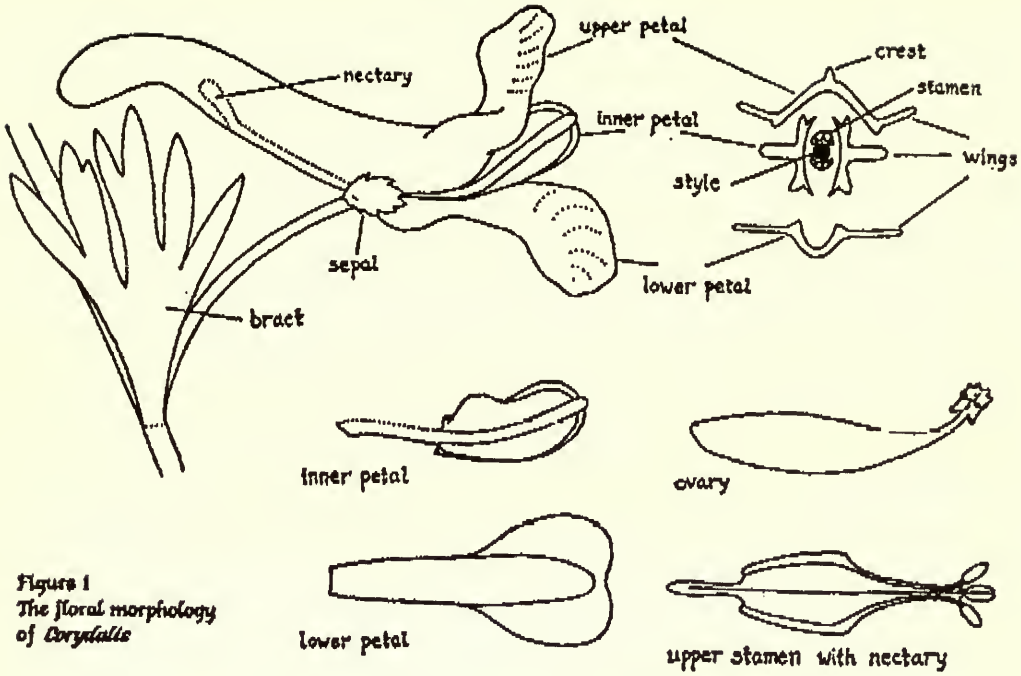


Figure 1
The floral morphology of *Corydalis*

Fig. 1 Schematic *Corydalis* flower.

6. Eastern species with their western limit in east or central Nepal: *C. trifoliata*, *C. ecristata*, *C. polygalina*, *C. sikkimensis*, *C. geraniifolia*, *C. cavei* (almost endemic), and *C. pseudolongipes*.
7. Eastern species with their western limit in west Nepal: *C. juncea*, *C. latiflora* s.lat., *C. staintonii*, *C. filicina*, *C. flaccida*, and *C. leptocarpa*.
8. Species occurring to the west of Nepal and reaching through Nepal to Sikkim (and sometimes further east): *C. cashmeriana* s.lat., *C. stracheyi*, *C. meifolia*, *C. chaerophylla*, *C. cornuta*, *C. casimiriana*, and *C. lathyroides*.

Life forms and ecology

The Nepalese species of *Corydalis* are essentially alpine. Three species only are found below 2000 m (*C. leptocarpa*, *C. terracina*, *C. chaerophylla*). The first two of these are sometimes found in man-made habitats. Among the high altitude species there are also some which are favoured by human activities, for example *C. hookeri* and *C. uncinata* which are often found in, or close to, villages, fields, and herdsmen's camps.

Corydalis casimiriana, *C. calycina*, and *C. filicina* usually grow in organic soil, in the grass turf of wet grazed meadows. They are apparently favoured by fire or animal trampling. Grassland is also the main habitat for some of the geophytic species of section *Fasciculatae*, but these species are often sensitive to grazing. In heavily grazed meadows *C. juncea* is frequently found concealed in low shrubs (e.g. *Juniperus squamata*), which give support to the very slender petioles and stem-bases, as well as protection from herbivores. The *Fasciculatae* are rarer in much disturbed ground or in burnt areas.

In the upper alpine zone, *Corydalis* species may form the bulk of the vegetation in certain habitats. *Corydalis nana* and *C. hendersonii* are found at the upper limit of vascular plant vegetation, over 6000 m. In rough screes on the north side of the main Himalayan range, *C. latiflora* is sometimes dominant. *Corydalis megacalyx* is also common here, but prefers a finer substrate. These scree-species often have very long rhizomes, where the annual growth may

amount to one or a few decimetres, and the total length, which may involve several shoot generations, up to at least seven dm. The ability to produce very long shoots in order to reach the surface is essential to perennial scree-plants, as repeated covering by mobile material is frequent. Storage tissues are always located in the oldest parts of the rhizome or usually in the taproot, if it persists. Above the surface, these scree plants form low, loose cushions.

Yet another life form is represented by other species of section *Capnogorium*: rosulate plants with axillary flowering shoots. They usually grow on more stable slopes, along tracks, among boulders, etc., often close to running water, e.g. *C. meifolia*, *C. stracheyi*, and *C. govaniana*. They have thick, more or less vertical, long rhizomes apically crowned by dense remnants of dead petiole-bases and cataphylls. The rhizome splits with age into several discrete conductive elements (which ultimately supply different rosettes), like a multistranded rope. If taken apart, each element is able to sprout along its whole length.

Key to the species

1	Flowers blue, pink, or purple	2
	Flowers yellow	9
2(1)	Racemes capitate; pedicels *c.* 5 mm long	**8. conspersa** (p. 495)
	Racemes not capitate; pedicels more than 5 mm long	3
3(2)	Spur much shorter than limb of upper petal	4
	Spur equalling or longer than limb of upper petal	6
4(3)	Stems 50–130 cm	**25. flaccida** (p. 523)
	Stems less than 20 cm	5
5(4)	Ultimate leaf-lobes obovate-obtuse	**9. latiflora** (p. 499)
	Ultimate leaf-lobes narrow, acute	**10. nana** (p. 503)
6(3)	Fasciculate storage-roots present; stems with one cauline leaf	7
	Fasciculate storage-roots absent; stems with two or more leaves	8
7(6)	Bracts entire; cauline leaf trifoliate	**2. trifoliata** (p. 484)
	Bracts divided; cauline leaf more divided	**3. cashmeriana** group (p. 485)
8(6)	Stems with two opposite leaves, tuberous	**1. diphylla** (p. 484)
	Stems with alternate leaves, not tuberous	**41. leptocarpa** (p. 534)
9(1)	Fasciculate storage-roots present on a short rhizome; stems leafless towards the tapering underground portion, basal rosette absent	10
	Fasciculate storage-roots absent; stems (if leafless at base) originating from a basal rosette	13
10(9)	Cauline leaves undivided, linear to lanceolate	11
	Cauline leaves pinnate	12
11(10)	Bracts 30–50 mm; racemes 2–5-flowered	**4. pseudojuncea** (p. 488)
	Bracts 5–20(–40) mm; racemes (3–)10–30(–40)-flowered	**5. juncea** (p. 488)
12(10)	Flowers 11–14 mm, dull yellow	**7. lowndesii** (p. 491)
	Flowers 14–19 mm, yellow with dark apex	**6. polygalina** (p. 490)
13(9)	Spur of upper petal much shorter than limb	14
	Spur of upper petal equalling limb	19
14(13)	Bracts entire	15
	Bracts divided	17
15(14)	Racemes lax, corolla 8–12 mm long	16
	Racemes very dense, corolla 15–17 mm long	**42. stricta** (p. 535)
16(15)	Small slender plant; pedicels 5–20 mm, erecto-patent in fruit	**40. lathyroides** (p. 534)
	Robust plant; pedicels 2–3 mm, bent downwards in fruit	**43. flabellata** (p. 535)
17(14)	Stems ascending, branched; racemes lax; seeds minutely papillose	**11. stracheyi** (p. 505)
	Stems erect, not or slightly branched; racemes dense; seeds smooth	18
18(17)	Basal leaf-remnants with persistent fibres; racemes 12–35-flowered	**12. meifolia** (p. 507)
	Basal leaf-remnants membranous; racemes 5–10-flowered	**13. sikkimensis** (p. 508)

19(13) Flowers 8–12 mm; stigma lacking basal papillae 20
Flowers more than 13 mm; stigma usually with basal papillae 25

20(19) Leaves pinnate; bracts entire ..... **40. lathyroides** (p. 534)
Leaves biternate; lower bracts divided 21

21(20) Nectary more than 1·5 mm, fused to the spur; lower petal with or without a basal pouch 22
Nectary 1 mm or less, not fused to the spur; lower petal with a basal pouch 24

22(21) Lower petal lacking a basal pouch 23
Lower petal with a basal pouch ..... **36. filiformis** (p. 530)

23(22) Sepals 2–3 mm; fruit obovoid ..... **37. calycina** (p. 532)
Sepals 0·5–1 mm; fruit linear ..... **39. casimiriana** (p. 533)

24(21) Outer petals long-acuminate; inner petals not tipped with blackish purple; stigma with 6 stalked apical papillae ..... **35. longipes** (p. 530)
Outer petals acute; inner petals tipped with blackish purple; stigma with 4 stalked apical papillae ..... **38. pseudolongipes** (p. 532)

25(19) Cauline leaves two, small, opposite 26
Cauline leaves alternate 27

26(25) Bracts pectinate ..... **14. govaniana** (p. 514)
Bracts entire ..... **15. simplex** (p. 514)

27(25) Pedicels more than 10 mm 28
Pedicels less than 10 mm 36

28(27) Small cushion-plants, less than 8 cm high 29
Not cushion-forming, more than 8 cm high 31

29(28) Leaves pinnate; bracts entire or slightly divided, clavate ..... **27. clavibracteata** (p. 525)
Leaves ternately divided; bracts much divided, leaf-like 30

30(29) Flowers 14–17 mm; sepals broad, much dentate ..... **26. megacalyx** (p. 524)
Flowers 20–22 mm; sepals narrowly linear ..... **28. hendersonii** (p. 525)

31(28) Fruiting pedicels apically hooked, erect 32
Fruiting pedicels arcuate to straight, not erect 33

32(31) Bracts entire; flowers 15–17 mm long ..... **19. uncinata** (p. 520)
Bracts divided; flowers 13–14 mm long ..... **20. uncinatella** (p. 520)

33(31) Flowering stems several; rhizome crowned by persistent straw-like leaf-bases ..... **17. staintonii** (p. 518)
Flowering stems one to few; rhizome not crowned by straw-like leaf-remnants 34

34(33) Stems robust; leaves pinnate; fruit obovoid ..... **16. elegans** (p. 518)
Stems slender; leaves usually ternate; fruit linear 35

35(34) Upper petal with broad blunt crest; spur shorter than limb ..... **34. cavei** (p. 529)
Upper petal acute; spur about as long as limb ..... **33. filicina** (p. 529)

36(27) Bracts obovate to broadly lanceolate, crispate-puberulent; upper leaves with stipule-like lower leaflets ..... **24. stipulata** (p. 522)
Bracts linear to divided, glabrous; upper leaves without stipule-like leaflets 37

37(36) Stems zigzagged; leaves 3–4 times ternate with leaf-lobes often less than 1 mm broad ..... **18. shakyae** (p. 519)
Stems not zigzagged; leaves less divided with ultimate leaf-lobes more than 1 mm broad 38

38(37) Fruit linear ..... **34. cavei** (p. 529)
Fruit obovoid 39

39(38) Robust rhizomatous perennials; stems leafy in upper half only 40
Slender taprooted biennials or perennials; stems leafy throughout 42

40(39) Bracts large, divided; racemes lax ..... **22. geraniifolia** (p. 522)
Bracts small, linear; racemes dense, secund 41

41(40) Stems unbranched, 25–50 cm high, with 1–3 leaves; with a basal rosette; lower petal with a distinct pouch ..... **23. terracina** (p. 522)
Stems branched above, 60–100(–130) cm high, leafy; rosulate leaves few, very long-petioled; lower petal usually without a distinct pouch ..... **21. chaerophylla** (p. 521)

42(39) Leaves pinnate with the first pair of leaflets smaller than the second pair; most bracts entire; racemes 10–40-flowered 43
Leaves subternate to pinnate with lowest pair of leaflets largest; most bracts divided racemes 8–15-flowered 44

43(42) Pedicels filiform; corolla not cristate ..... **30. spicata** (p. 528)
Pedicels not filiform; corolla cristate ..... **29. hookeri** (p. 526)

44(42) Seeds punctulate; crest of upper petal entire; pedicels 2–5 mm ..... **32. cornuta** (p. 528)
Seeds smooth; crest of upper petal dentate; pedicels 4–10 mm ..... **31. vaginans** (p. 528)

Revision of the species

Sect. **LEONTICOIDES** DC.

DeCandolle, 1821: 114. Type species: *C. verticillata* DC.

Tuberous, tuber perennial; flowering stems lacking a basal scale leaf, usually with two opposite leaves on the stem and a lax raceme.

1. **C. diphylla** Wallich — Map 9; Fig. 2A; 24B

Wallich, 1826: 54. Type: Kumaon, Serinagur, *Blinkworth*, Wallich cat. 1430 (K-W—holotype).
C. rutifolia auct., non Sibth. & Sm.
C. murreana Jafri, 1974:7. Type: Pakistan, Murree hills, *Stewart* 1647 (RAW—holotype, K. S).

Tuber (not seen on Nepalese specimens) 2–5 cm, rounded or somewhat irregular. Stems leafless towards the tapering underground portion. Cauline leaves opposite, two, petiolate (in the other species in this section they are sessile), biternate with deeply divided leaflets, petiolules longer than petioles, ultimate leaflets obovate-obtuse. Racemes 3–5-flowered, lax. Pedicels *c.* 10 mm long, elongating in fruit to 15–30 mm. Bracts 4–9 mm, ovate-lanceolate. Flowers white with ± purplish face, 18–19 mm long, with spur *c.* 12 mm, upwardly curved. Inner petals 10 mm long. Fruit 15–20 mm including style 4 mm, 5–8-seeded, elliptic-oblong. Seeds shiny, 1·9 mm.

Habitat. In forest; 2600 m.

Distribution. From west Nepal to Kashmir.

Kawa Kater Dara, 29° 31′ N., 81° 57′ E., 26 April 1952. *PSW* 846 (BM).

The Kumaon and Nepalese specimens are unusual in having narrow corollas and axillary branches.

Sect. **FASCICULATAE** Maxim.

Maximowicz, 1889: 39; § *Curviflorae* Fedde, 1919: 197; sect. *Rapiferae* Fedde, 1936: 128. Type species: *C. cashmeriana* Royle.
Sect. *Trachycarpae* (Fedde) Fedde, 1936: 128. Type species: *C. trachycarpa* Maxim.
Sect. *Oreocapnos* Popov, 1937: 699 nom. nud. (Art. 32.1); Wu & Chuang, 1982:7.

Flowering stems leafless below, arising from the axils of fleshy scales forming small bulbils on a short vertical rhizome. Some bulbil-scales terminating in radical leaves. Fleshy storage roots produced anew each year from the rhizome. Cauline leaves few.

2. **C. trifoliata** Franchet — Map 2; Fig. 2B; 6D

Franchet, 1886: 392; *C. trifoliolata* in orig. icon and *Index Kewensis*. Type: Yunnan, montis Tsang-chan supra Tali, 4000 m, 4 August 1884, *Delavay* 82 (not seen).

Stems simple, 8–25 cm. Tubers napiform, sessile. Radical leaves small, trifoliolate with long slender petioles. Leaflets entire or slightly divided. Cauline leaf solitary, shortly stalked, trifoliolate with broadly obovate entire leaflets. Racemes dense, 2–5-flowered. Bracts broadly obovate to elliptic, entire, 10–15 mm, longer than the 5–8 mm long pedicels. Flowers blue, 11–16 mm, with spur 3–7 mm, not or very narrowly cristate. Fruits and seeds unknown. Immature capsules like those of *C. cashmeriana*.

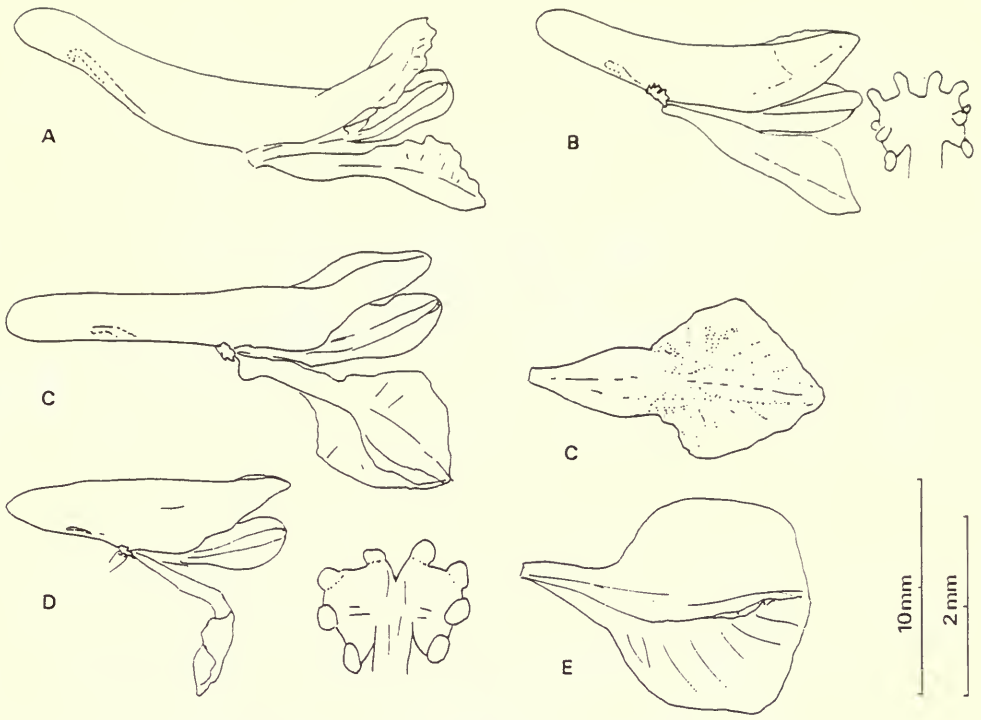


Fig. 2 A: *Corydalis diphylla* (*PSW* 846). B: *C. trifoliata* (*Beer* 9546). C, D: *C. cashmeriana* (C, *PSW* 266; D, *Lowndes* 1467). E: *C. ecristata* (*Williams* 770). Flowers and stigmas. The 10mm bar refers to flowers and the 2mm bar refers to stigmas.

HABITAT. In Rhododendron; 3800–4300m.

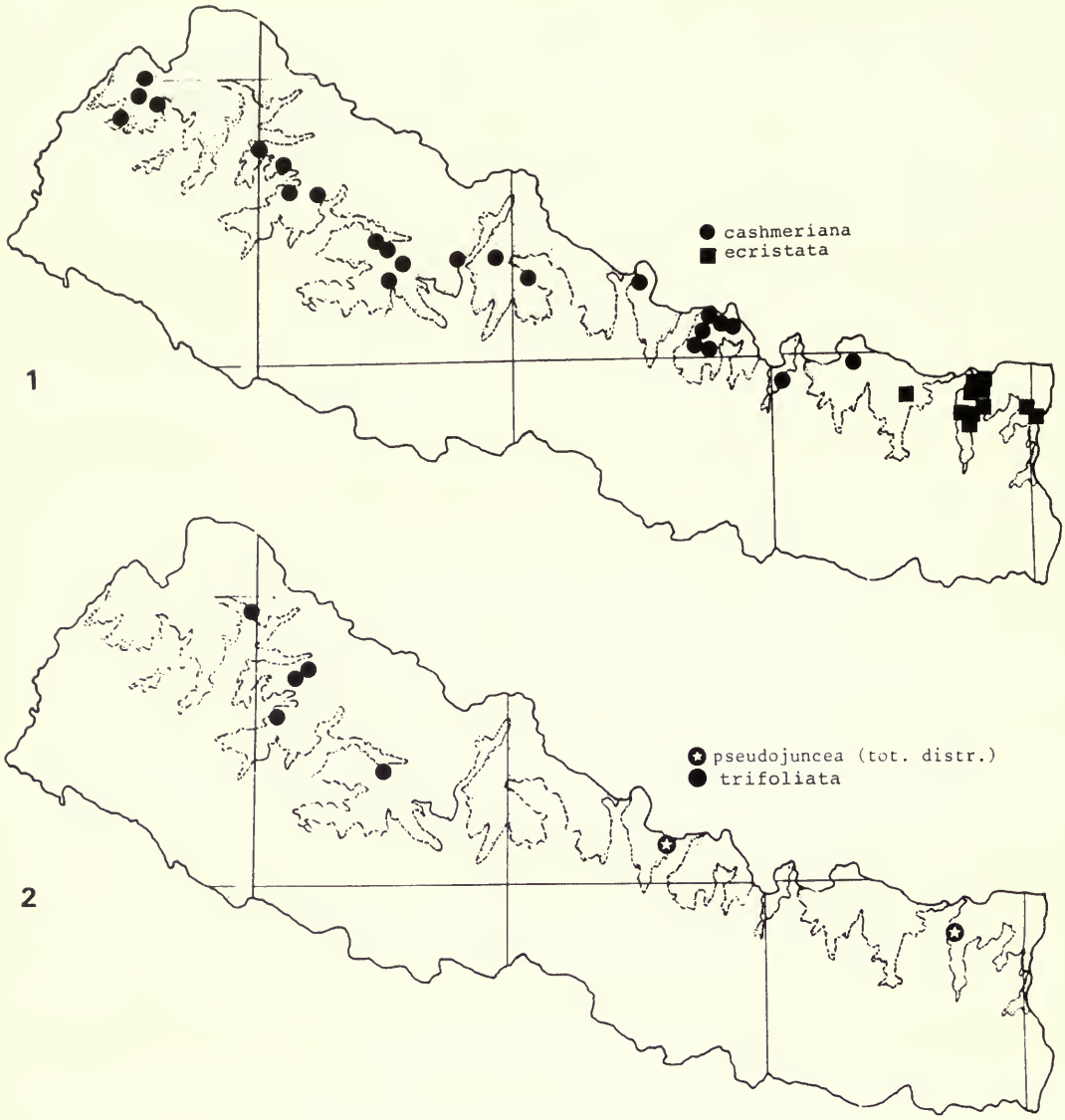
DISTRIBUTION. Central and east Nepal, east Himalaya to SW. China.

1 July–1 October (earliest and latest collection in flower).

Beer 9546 (BM), 25520 (BM); *Kanai & Shakya* 672215 (KATH); *Polunin* 1044 (BM); Chuwar, 11 August 1932, *K. N. Sharma* E420 (BM, E).

3. **C. cashmeriana** group

Similar to *C. trifoliata*, but tubers often more elongate, sometimes branched. Flowering stems 5–20cm, usually with one sessile, bi- to tri-ternate leaf with narrowly lanceolate segments. Radical leaves few with a small ternate lamina on a very long filiform petiole. Leaflets ovate, lobed, segments broader than those of the cauline leaf, rarely with long petiolules and again ternate. Racemes corymbose, 2–8-flowered, slightly elongating in fruit. Bracts 8–10mm, deeply cut into narrowly lanceolate segments, shorter than the pedicels. Pedicels (10–)15–30(–40)mm in fruit, erecto-patent to suberect, apically hooked. Flowers intensely blue (inner petals whitish), 11–21mm long from apex of spur to the tips of the inner petals. Spur 4–13mm, lower petal 7–14mm. Outer petals narrowly cristate or not cristate.



3a. **C. cashmeriana** Royle Map 1; Fig. 2C–D; 3A–B

Royle, 1833: 69. Type: Kashmir, *Royle* s.n. (LIVU, lectotype selected by D. G. Long, 1984).

C. ecristata var. *longicalcarata* D. Long 1984: 93. Type: Bhutan, Thimphu district, above Barshong, 3960 m. May 1949, *Ludlow, Sherriff & Hicks* 16350 (E—holotype, BM, K).

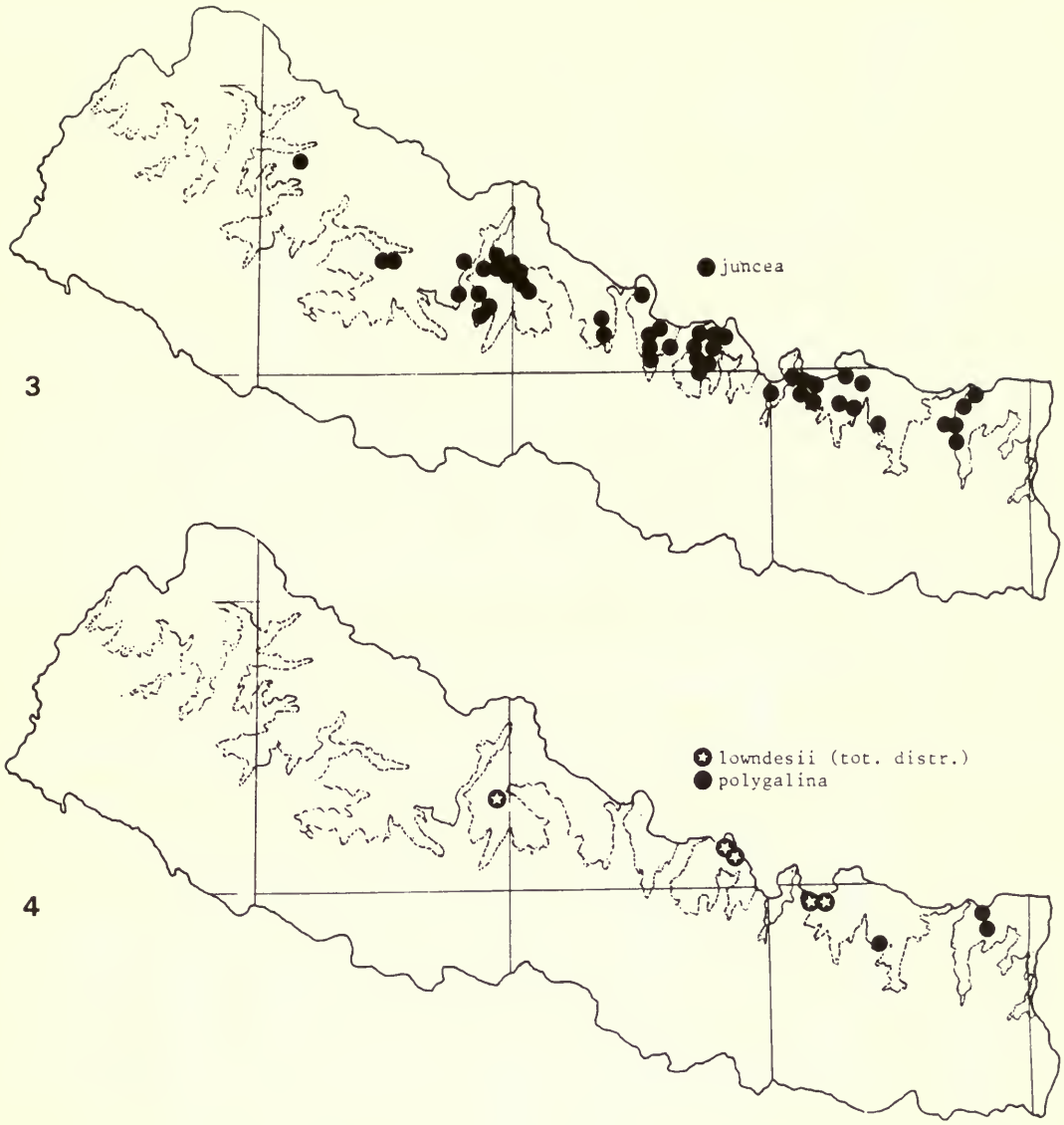
Lower petal with rhombic-acute limb, surpassing the upper by 1–4 mm. Ultimate leaflets (0·7–)1–1·7(–2·5) mm broad. Bracts 2–7-fid. Capsule 11–15 mm, linear, pendent on erect pedicels, 10–20-seeded. Style 2–3 mm.

Habitat. Open slopes; 2800–5500 m.

Distribution. Kashmir to Sikkim, W. Bhutan, E. Tibet.

14 April–27 August.

Bailey 115 (BM), s.n. 31 May 1936 (E); *Bowes-Lyon* 2107 (BM); *Burnet* 17 (BM); *Dobremez* 2198 (BM); *Duthie* 5315 (BM); *Einarsson* et al. 201 (BM, LD, S); *Gardner* 646 (BM); *Lowndes* 1156 (BM), 1467



(BM); *Miehe* 1486 (0), 2979 (BM), 4659 (GOET), 4928 (GZU), 4980 (BM), 5151 (Xining), 5301*a* (BM), 5921 (BM), 6052 (BM); *Polunin* 191 (BM), 643 (BM), 1707 (BM); *PSW* 266 (BM, E, KATH), 870 (BM, E KATH), 1609 (BM), 2353 (BM, E, KATH), 4069 (BM, E, KATH), 4717 (E); *Sharma* E100 (BM), E413 (BM, E); *Shrestha* 4136 (KATH), 5057 ((BM, KATH); *Rajbandhari* 1955 (KATH); *Shakya, Adhikari & Subedi* 8125 (KATH); *SSW* 355 (BM, E, KATH), 413 (BM, E, KATH), 1823 (BM, KATH), 3073 (BM, E, KATH), 3223 (BM), 6081 (BM, E, KATH); *Tyson* 4 (BM); *Vickery* 815 (BM).

In W. Himalaya, the racemes are 3–9-flowered, whereas E. of Annapurna they are (1–)2-flowered. There are also other minor differences. High mountain forms from the Tibetan border may constitute a third distinct taxon. A revision of this group is in preparation.

3b. **C. ecristata** (Prain) D. Long Map. 1; Fig. 2E; 3C–D

D. Long, 1984: 91. *C. cashmeriana* var. *ecristata* Prain, 1896: 22. Type: Jongri, Ney-go-La, July 1887, *King's collector* s.n. (K, CAL, not seen).

C. cashmeriana var. *brevicornu* Prain, 1896: 22; *cashmeriana* subsp. *brevicornu* (Prain) D. Long, 1984: 90. Type: Panka-La above Chumbi, July 1878, *Dungbo* s.n. (K.).

Usually smaller than *C. cashmeriana*. Lower petal with very broad truncate limb, surpassing the upper by 2–7 mm. Ultimate leaf-lobes 0·5–1(–1·7) mm broad. Bracts 3–13–fid. Racemes less elongated in fruit. Capsule 5–8 mm, oblong, *c.* 10–seeded. Style 2–3 mm.

HABITAT. Mossy rocks, screes; 4000–5000 m.

DISTRIBUTION. East Nepal from Arun Khola to Sikkim, Bhutan and Arunachal Pradesh.

18 June–1 September.

Beer 8302 (BM), 8321 (BM), 8357 (BM), 9550 (BM); *Binns* 169 (BM, E); *McCosh* 283 (BM, E, KATH); *Shrestha* 15769 (KATH); *Shrestha & Joshi* 333 (BM, KATH); *G. F. Smith* 13 (BM), 5 (BM), 130 (BM), 175 (BM); *Stainton* 883 (BM, E, KATH); *Williams* 770 (BM).

4. **C. pseudojuncea** Ludlow Map 2; Fig. 4D; 5D

in Ludlow & Stearn, 1975: 62. Type: West Nepal, near Jangla Banjyang, 28° 51′ N., 82° 56′ E., 4000 m, 2 July 1952, *PSW* 2360 (BM—holotype, E, KATH).

Storage roots fusiform, sessile. Stems 9–35 cm (including underground part) with one linear leaf 3–6(–8) cm. Radical leaves few with very long filiform petioles, biternate with long leaflets similar to the cauline leaf. Racemes 2–5-flowered. Bracts 30–50 mm, like the cauline leaf, much longer than the short, 3–5 mm long pedicels. Flowers yellow, veined with greenish brown, not tipped with dark purple, 13–16 mm long including spur 7–9 mm. Dorsal crest very narrow or absent. Fruit linear, deflexed, 22 mm long with style 2·5 mm, 8–10-seeded. Seeds (immature) 1·2 mm.

HABITAT. Grassy slopes; 3800–4500 m.

DISTRIBUTION. West Nepal, S. Tibet (Wu & Chuang, 1984).

15 June–14 July.

Einarsson et al. 692 (BM), 815 (BM); *PSW* 136 (BM), 2360 (BM, E, KATH, 4319 (BM), 4688 (BM, E); *Shrestha* 5218 (BM, KATH).

5. **C. juncea** Wallich Map. 3; Fig. 4A–C; 5A–C

Wallich, 1826: 54. Type: C. Nepal, Gossain-Than, *Wallich* (K-W—holotype, BM, K).

Storage roots fusiform, often attenuate or shortly stalked at base, not branched, Stems 10–45 cm with 0–2, entire, linear to lanceolate cauline leaves, 1–6 × 0·2–1 cm long, exceptionally ternate. Radical leaves usually biternate with linear to obovate leaflets, rarely triternate with deeply cut leaflets. Racemes 5–20 cm, spicate, (3–)10–30(–40)-flowered. Bracts 5–20(–40) mm, linear to broadly lanceolate. Pedicels 5–15(–20) mm. Flowers 10–20 mm, yellow, inner petals almost always tipped with blackish purple. Upper petal usually rather broadly cristate with a slightly upwardly curved or straight spur, shorter than to as long as remainder of corolla. Fruit *c.* 13 mm long, linear-lanceolate, *c.* 10-seeded. Style 3 mm. Seeds shiny, 1·0 mm.

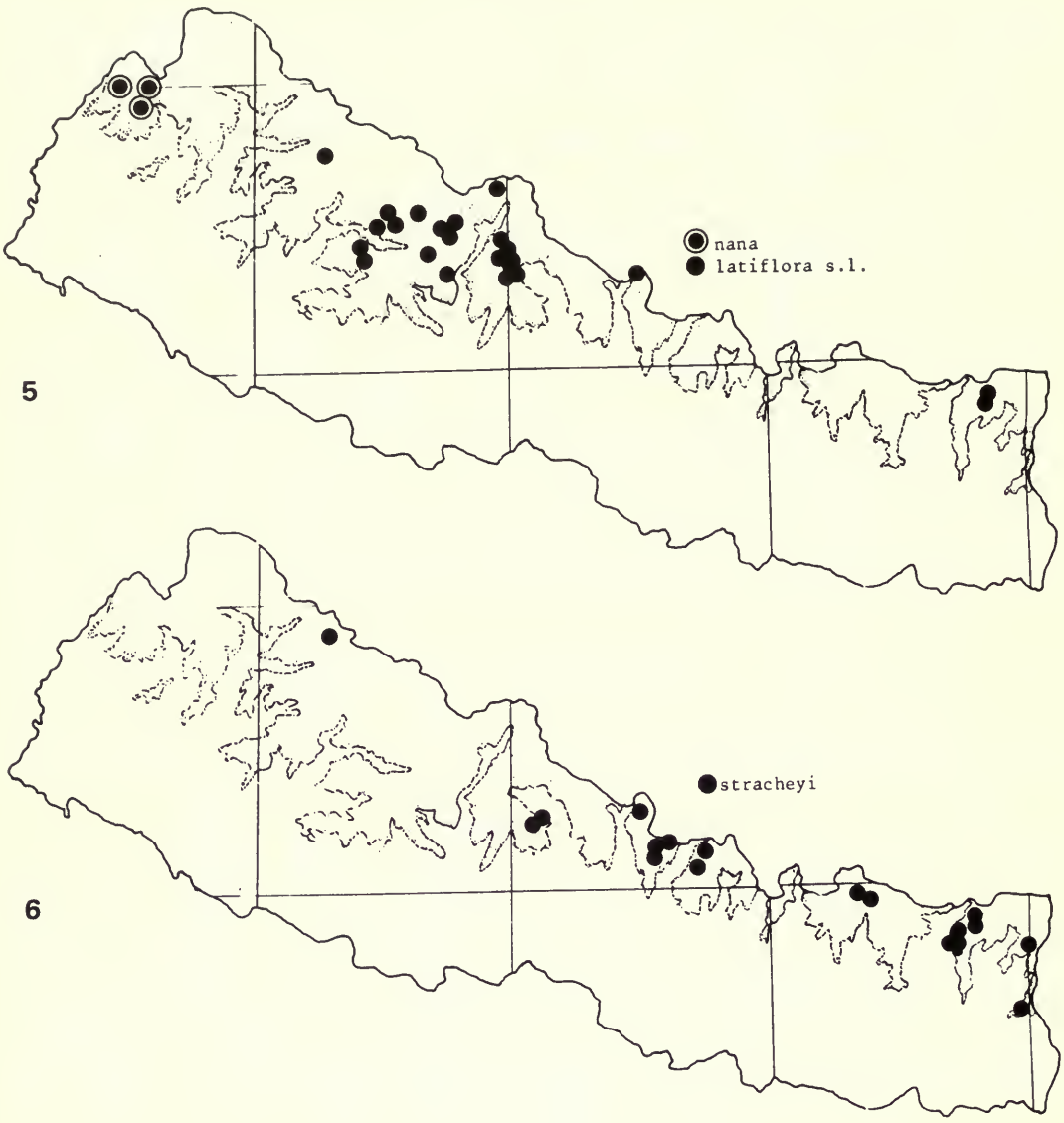
HABITAT. Grassland; in heavily grazed pastures frequently hiding in low shrubs; 2500–5100 m.

DISTRIBUTION. From Dhaulaghiri eastward to Arunachal Pradesh, SE. Tibet. 'Common in alpine meadows N. of Annapurna and Daulaghiri, and around Poykotang.'

27 April–5 October.

Banerji & Shakya 3757 (KATH); *Bailey* s.n. (BM), 'Balugang' (E); *Beer* 9442 (BM), 9535 (BM), 10088 (BM), 25329 (BM); *Bowes-Lyon* 83 (BM), 2164 (BM); *Dhwoj* 165 (BM, E), 199 (BM, E); *Dobremez* 91 (BM), 405 (BM), 1670 (BM); *deHaas 2123 (BM); Gardner* 835 (BM); *Idzumi & Togashi* sep. 1979 (TI); *Joshi & Battacharya* 74–2397 (KATH); *Kanai & Malla* 674668 (KATH, TI); *Kanai & Shakya* 214 (TI), 2200 (TI), 2330 (TI), 2323 (TI); *Lowndes* 1122 (BM), 1239 (BM); *McBeath* 1499 (E); *McCosh* 202 (BM, KATH), 203 (BM, E, KATH), 341 (BM, TI); *Malla* 9169 (BM); *Miehe* 262 (BM), 879 (BM), 994 (BM), 983 (BM), 5433 (Xining), 7354 (GOET), 8268 (BM), 8461 (Xining), 9201 (GOET), 9297 (BM), 10917 (BM), 11681 (BM), 13835 (BM), 13873 (BM); Langtang, *Poelt* s.n. (GZU); *Polunin* 283 (BM), 1010 (BM), 1079 (BM); *K. R. Rajbandari* 7682 (KATH), 8402 (BM), 8750 (KATH), 9828 (KATH); *Rajbandari & Roy* 1704 (KATH); *Ramola, Mangu & Saha* 311 (KATH); *Schilling & Sayers* 3757

Fig. 3 A, B: *Corydalis cashmeriana* (A. *Lowndes* 1467; B, *PSW* 266). C, D: *C. ecristata* (C, *Beer* 8357; D. *Williams* 770). × ¼.



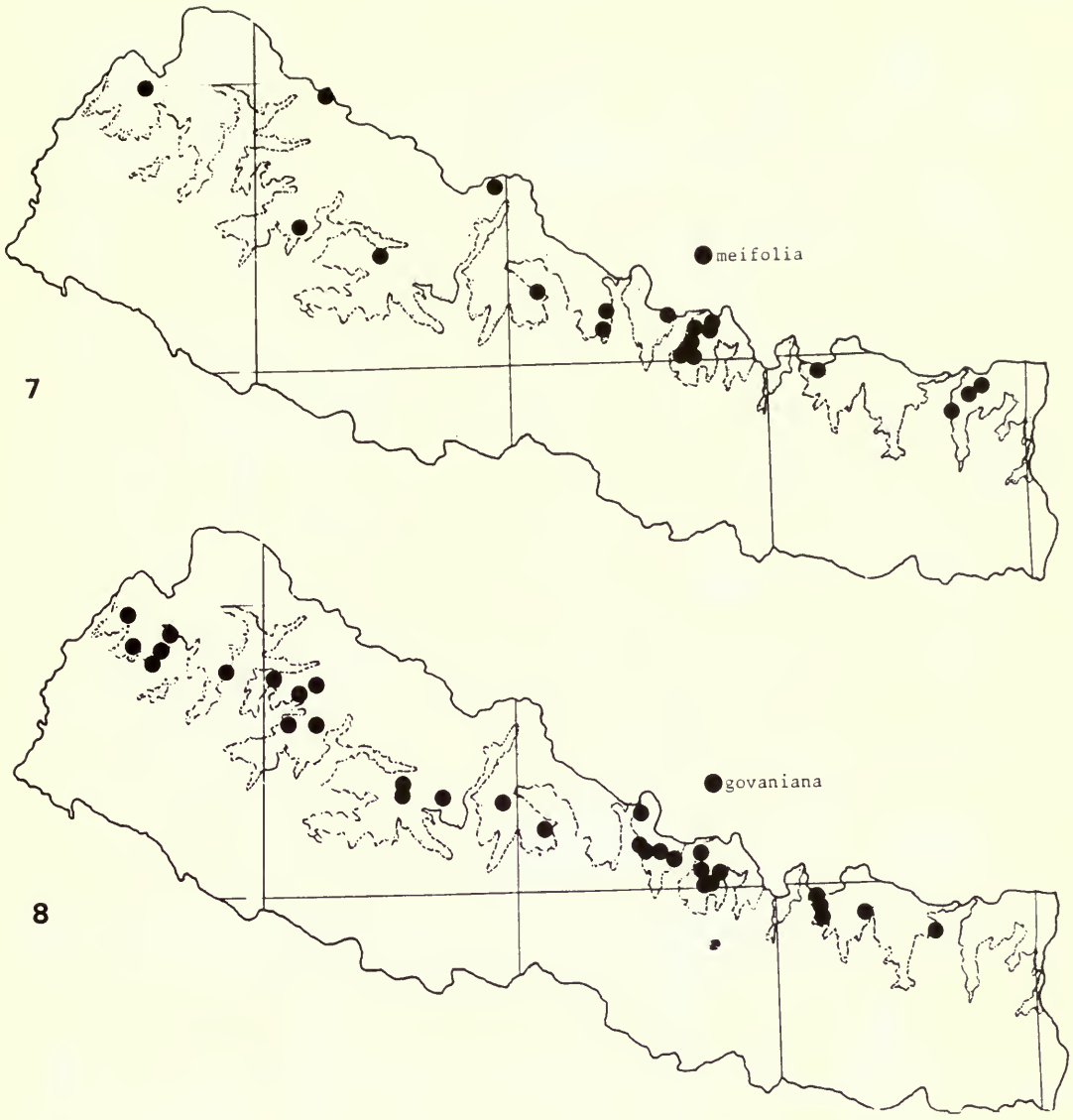
(KATH); *Shrestha & Joshi* 296 (BM), 449 (BM); *Shrestha & Shakya* 3757 (KATH); *Smith* 51 (BM); *Stainton* 4538 (BM, E), 4776 (BM), 4779 (BM, E); *SSW* 1329 (BM), 1762 (BM, E, KATH), 1991 (BM, KATH), 3148 (BM, KATH), 6027 (BM, KATH). Cultivated in GBG (Göteborg Botanical Garden).

6. **C. polygalina** Hook. f. & Thomson Map 4; Fig. 5F–G; 6C

Hooker & Thomson, 1855: 263. Type: Sikkim, 4250–4900m, *Hooker & Thomson* (K—lectotype, BM, E).

C. graminea Prain, 1896: 23. Type: Sikkim, Peykiong-La, 3950m, *King's collector* (CAL—holotype, photos in BM, E, S).

Tubers long, attenuate, into a distinct stalk, often branched. Stems 12–25cm, simple or branched, weak. Radical leaves with long thin petioles, ternate to biternate, or sub-pinnate with narrowly lanceolate segments. Cauline leaves 1–3, pinnate, with 2–3 pairs of linear-lanceolate leaflets, upper leaves less divided. Racemes 5–15-flowered. Lower bracts leaflike, the upper shorter and entire, usually shorter than the pedicels. Pedicels 10–20mm long.



Flowers 14–19mm long, yellow, cristate, with spur equalling or slightly shorter than limb. Inner petals dark brownish purple at tip. Fruit 8mm, 6–9-seeded, obovoid, style 3mm. Seeds shiny, 1·2mm.

HABITAT. Grassland; 3950–4600m.

DISTRIBUTION. East Nepal, Sikkim, Bhutan, SE. Tibet.

30 June–26 July.

Beer 8332 (BM); *McCosh* 327 (BM, KATH); *Shrestha & Joshi* 343 (BM).

7. **C. lowndesii** Lidén, **sp. nov.** Map 4; Fig. 5E; 6A–B

Corydali polygalinae similis sed caulibus pluribus humilibus adscendentibus. Folia radicalia pauca ternata vel pinnata foliolis ternatis vel subbiternatis segmentis ultimis anguste linearibus vel lanceolatis. Folia caulina 2–4, radicalibus similia. Racemi 2–7-flori, densiusculi, in fructu elongati. Flores lutei, 11–14mm,

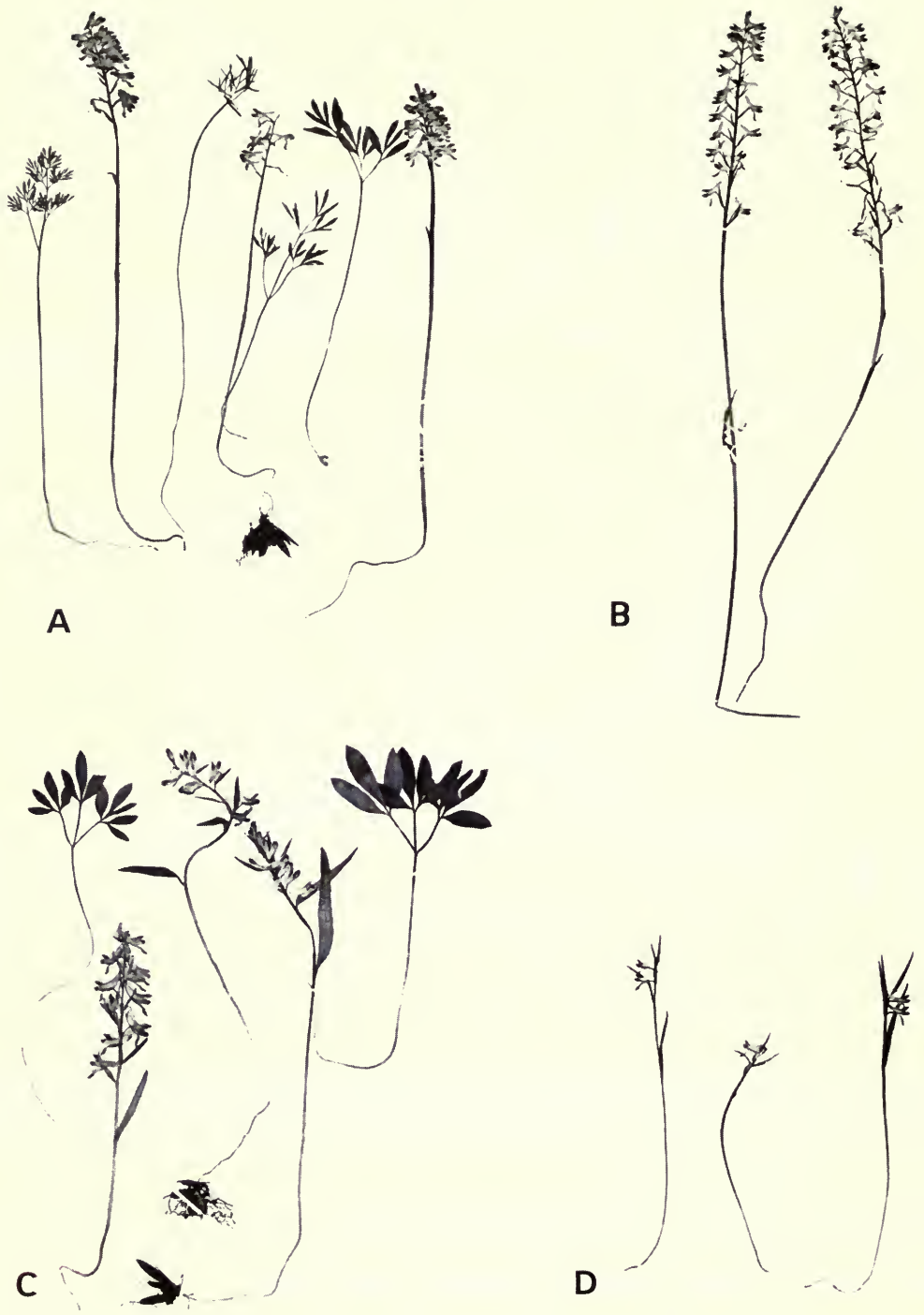


Fig. 4 A–C: *Corydalis juncea* (A, *Stainton* 4779; B, *SSW* 1991; C, *Stainton* 4538). D: *C. pseudojuncea* (*Einarsson* et al. 692). × ¼.

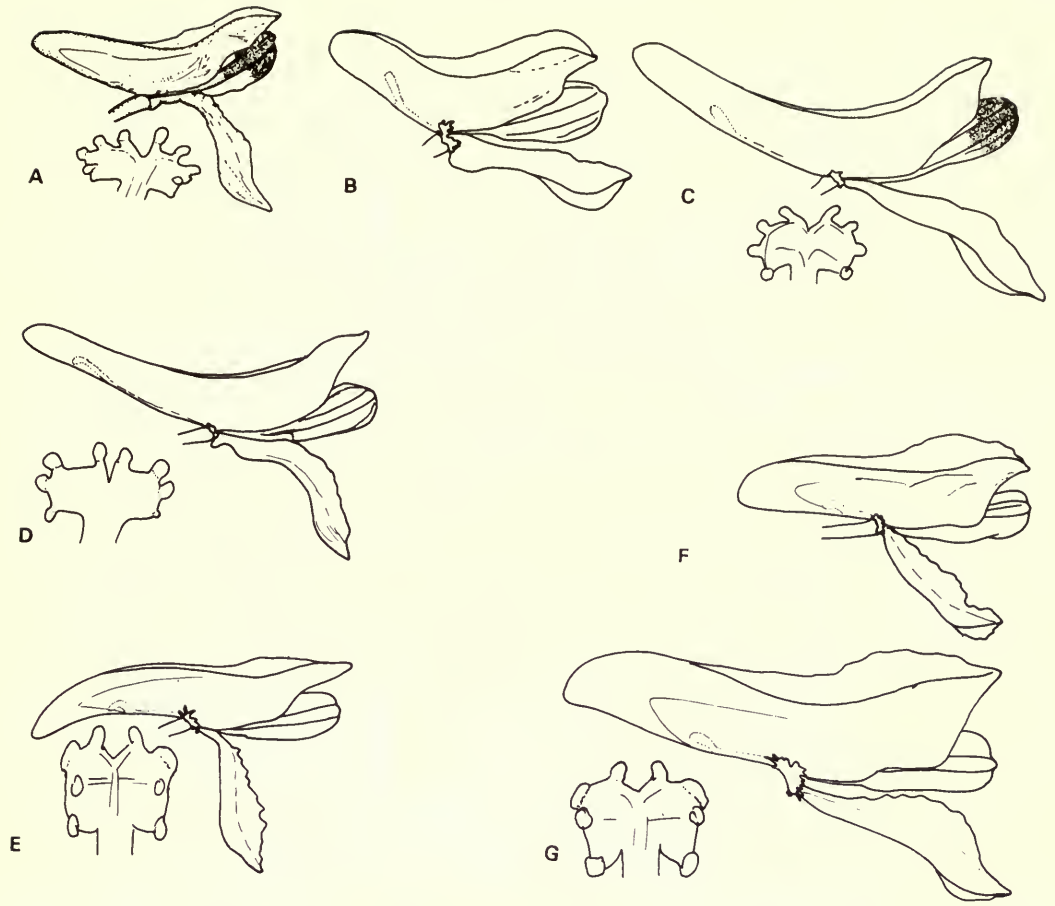


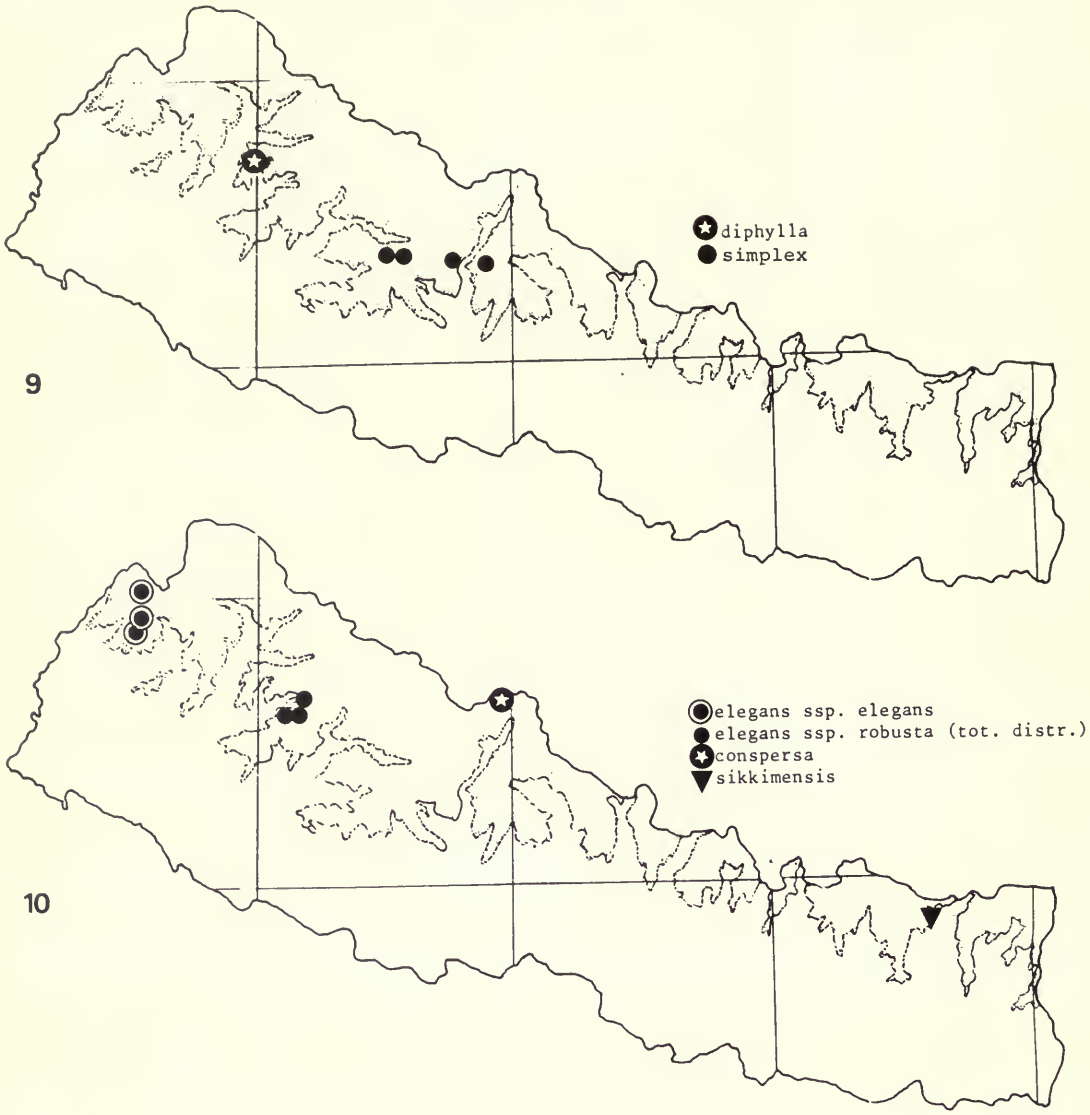
Fig. 5 A–C: *Corydalis juncea* (A, *Lidén*, E. of Thorung La, cult. in GBG; B, *Smith* 51; C, *Stainton* 4538). D: *C. pseudojuncea* (*Einarsson* et al. 692). E: *C. lowndesii* (type). F, G: *C. polygalina* (F, *McCosh* 327; G, *Shrestha & Joshi* 343). Flowers and stigmas. For scales see Fig. 2.

anguste cristati. Capsula immatura anguste obovata, 9mm longa. Pedicelli fructiferi reflexi. Semina nitida, 1·6mm longa.

Type: Nepal, Khangsar, '16,500', on stony turf among boulders on open hillside. Flowers dull yellow masked with greyish ochre', 28 vii 1950 *Lowndes* 1289 (BM—holotype).
Corydalis polygalina in Whitmore in Hara & Williams, 1979: 35 p.p.
Corydalis polygalina var. *micrantha* Wu 1984: 285 p.p. (excl. type ?).

Somewhat similar to *C. polygalina*, but stems usually several, 10–20cm. Tuberous roots long, attenuate into a distinct stalk, often branched. Radical leaves few with long thin petioles, ternate to pinnate with ternate to sub-biternate leaflets. Ultimate leaf-lobes linear to lanceolate. Cauline leaves 2–4, like the radical, sessile. Racemes 2–7-flowered, rather dense, elongating in fruit. Lower bracts leaf-like, uppermost sometimes entire, lower bracts longer, upper ones shorter, than the 5–10mm long pedicels. Flowers 11–14mm, 'dull yellow masked with greyish ochre', narrowly cristate with spur slightly shorter than lamina. Immature fruits to 9mm long, narrowly obovoid, borne on sharply deflexed pedicels, 6-seeded. Style 2·5mm. Seeds 1·6mm, shiny.

Habitat. Stony turf among boulders on open hillside; 4100–5700m.



DISTRIBUTION. Central and east Nepal, south Tibet (Rhamne, 7 July 1939, *Gould* 2333, K!).

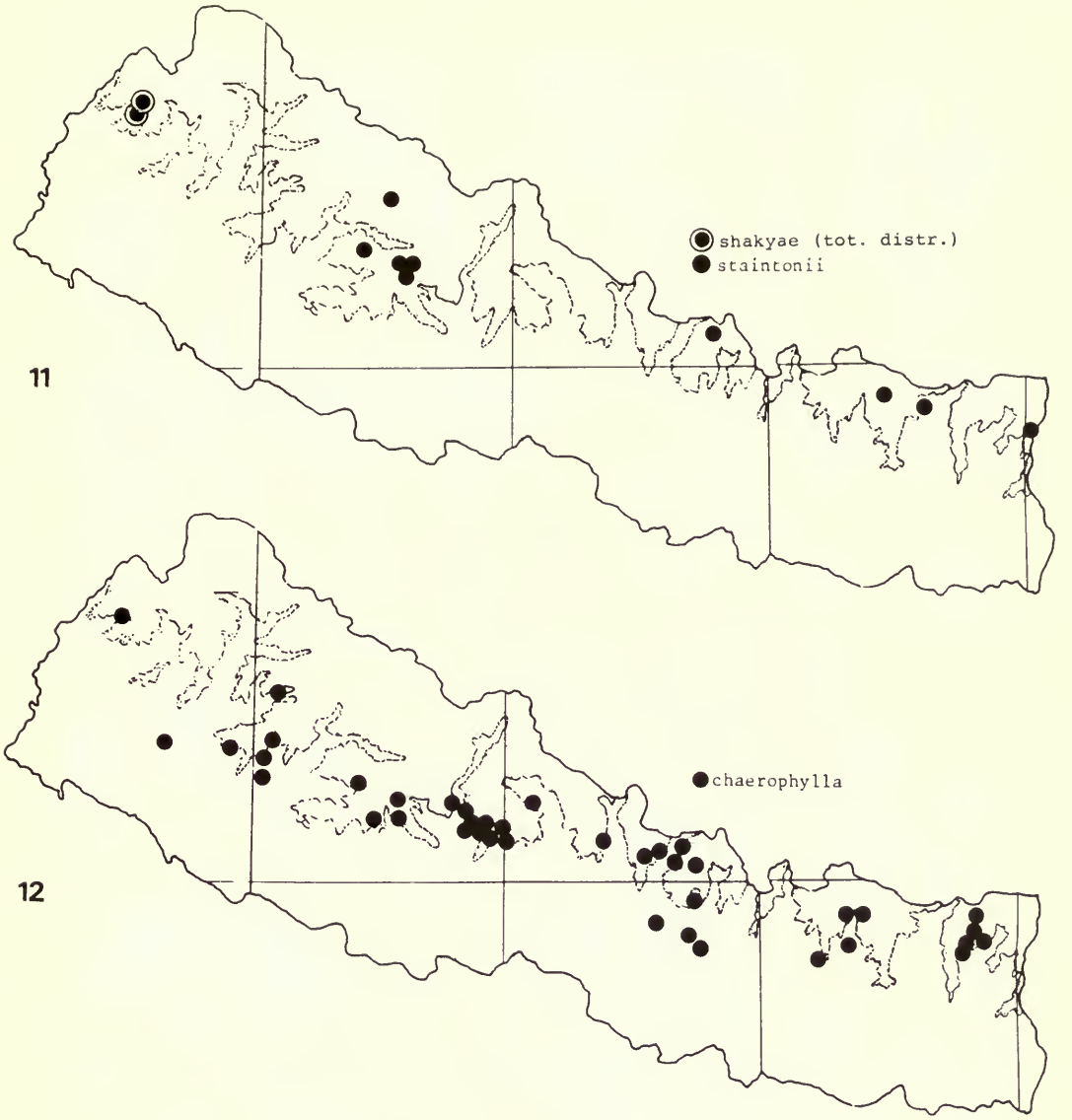
20 June–1 October.

Lowndes 1289 (BM); *Miehe* 13036? (BM, sterile); *Polunin* 667C (BM); *Rajbandari & Roy* 1854 (KATH); *Stainton* 4702 (BM, KATH).

Sect. **HAMATAE** C. Y. Wu & Z. Y. Su

Wu, C. Y. & Su, Z. Y. in Su, Z. Y., 1986: 407. Type species: *C. hamata* Franchet.

Caespitose perennials with short rootstock emitting numerous long, soft, somewhat fleshy roots. Stems leafy, leaves crowded towards the base, much divided, with sheathing petioles. Racemes many-flowered, very compact. Flowers short-stalked, yellow, often tinged with brown, blue or purplish. Upper petal with a hamately curved spur. Tibet and west China.



8. **C. conspersa** Maxim. Map 10; Fig. 11E; 12A

Maximowicz, 1889: 49. Type: NE. Tibet, north of Dy Chu (upper Yang-tse), 20 June 1884, *Przewalski* (LE, not seen, but beautifully illustrated by Maximowicz).

C. hamata sensu Whitmore in Hara & Williams, 1979: 34, non Franchet.

Stems several, 15–30cm, leafy, unbranched. Cauline leaves 5–10, glaucous, pinnate, with 2–4 pairs of pinnate to pinnatisect leaflets. Ultimate lobes small, broadly oblong to obovate, obtuse, often imbricate. Racemes capitate, very dense, 3–4 × 2–2·5cm, *c.* 30-flowered. Bracts 6–8mm long, broadly spathulate with irregularly erose apex, distal part purplish brown. Pedicels 5mm long. Flowers 15–16mm long with short much curved spur. Sepals large, fimbriate, dark brownish purple (?). Outer petals 'pale yellow tipped blue', winged and cristate, tipped with the same colour as the sepals when dry. Fruit unknown.

DISTRIBUTION. Tibetan Plateau, with one record from Nepal.

Namdo N. of Mustang (29° 14′ N., 84° 58′ W.), 5000m, 9 August 1954, *SSW* 2316 (BM, KATH).

Fig. 6 A, B: *Corydalis lowndesii* (A, *Stainton* 4702; B, type). C: *C. polygalina* (*Beer* 8332). D: *C. trifoliata* (*Beer* 9546). × ¼.

Sect. **CAPNOGORIUM** (Bernh.) Endlicher

Endlicher, 1850: 32; *Capnogorium* Bernh., 1842; *Calocapnos* Spach, 1839: 72; sect. *Calocapnos* (Spach) Popov, 1937: 685; Type species: *C. nobilis* (L.) Pers.

A loosely circumscribed section in which are included perennials with vertical monopodial rhizomes, which are apically clothed with cataphylls, withered leaf-bases and/or rosettes of leaves from which axillary flowering stems arise. Stems often sparingly leafy, and not or slightly branched. Flowers usually yellow, ± cristate, acute. Stigma ± square with usually pronounced lateral and basal double papillae. The section is closely related to sections *Oocapnos*, *Ramoso-Sibiricae* and *Mucroniferae*. It has its main distribution in drier parts of the Sino-Himalayan area.

Fig. 7 A, B: *Corydalis latiflora* (A, *Lowndes* 1316; B, *Stainton* 5485). C: *C. nana* (*Arnold* 164). D: *C. stracheyi* (*Stainton* 849). × ¼.

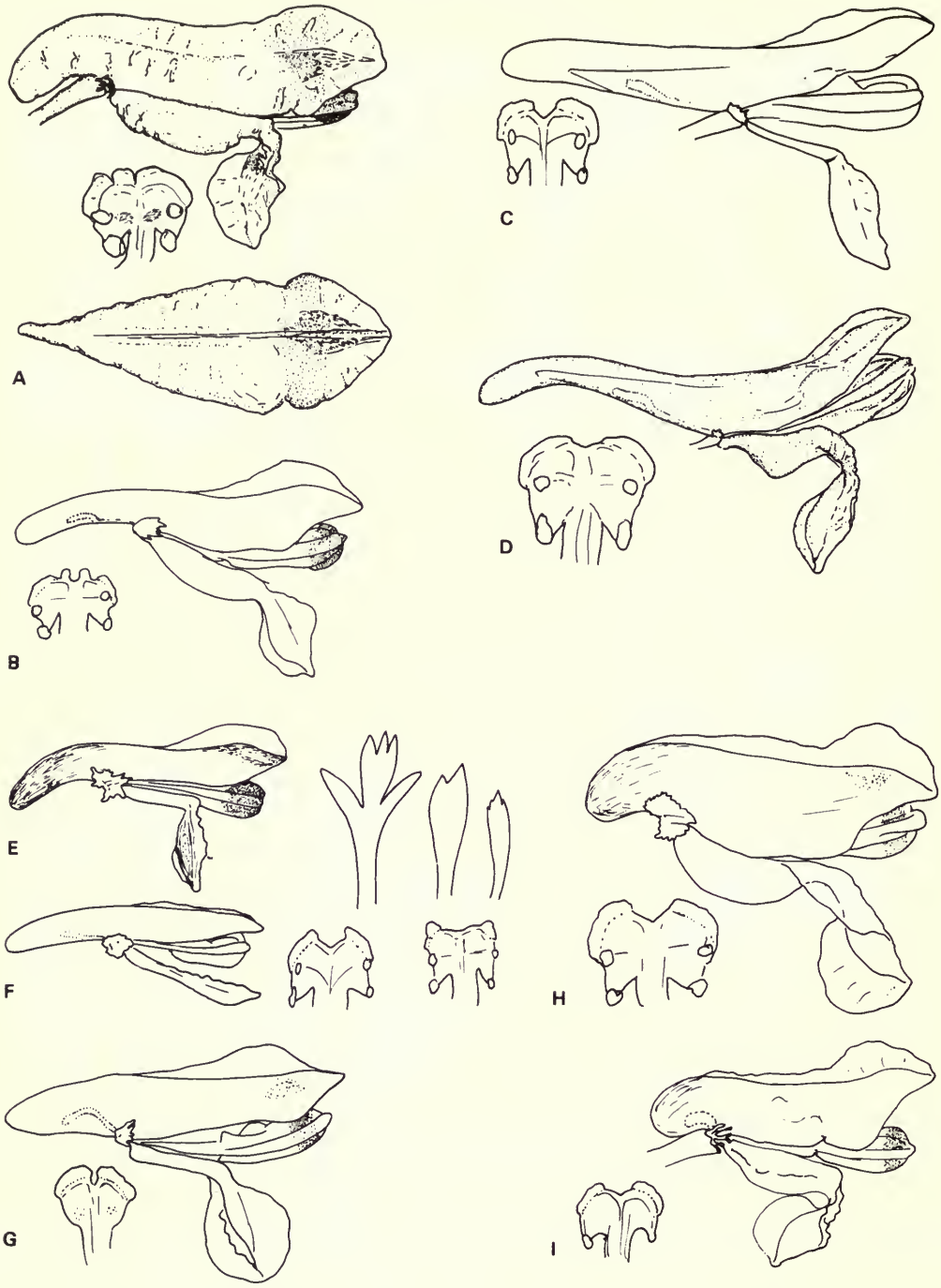


Fig. 8 A: *Corydalis latiflora* (*Lidén* 85, Thorung La, cult. in GBG). B: *C. nana* (*Arnold* 164). C: *C. simplex* (type). D: *C. govaniana* (*Lidén* 85, N. of Pangsing Banyang, cult. in GBG). E, F: *C. stracheyi* (E, *Beer* 8349; F, *PSW* 5365). G: *C. sikkimensis* (*Beer* 9555). H, I: *C. meifolia* (H, *Malla* 9538; I, *Stainton* 993). Flowers, stigmas, and (in E) bracts. For scales see Fig. 2.

9. **C. latiflora** Hook.f. & Thomson Map 5; Fig. 7A–B; 8A

Hooker & Thomson, 1855: 270. Type: Sikkim ad Tankra, *Hooker* (K—lectotype, E).
C. gerdae Fedde, 1922: 30. Type: Bhutan, Chumolari (border Tibet–Bhutan), 4880m, September 1912, *Rhoma Lepcha* 525 (E—holotype); Whitmore in Hara & Williams, 1979: 33.
C. alburyi Ludlow, 1975: 49, Whitmore in Hara & Williams, 1979: 33. Type: Nepal, between Chharka and Sangda (28° 50′ N., 83° 30′ E.), 5000m, 23 July 1966, *Stainton* 5571 (BM—holotype).
C. mitae Kitam., 1955: 2. Type: Thaple pass, 4300m, 1 July 1953, *Nakao* (KYO—holotype).

Rootstock often very long, slender. Whole plant with a greyish-purplish hue, forming loose cushions between boulders on rough screes. Flowering stems 5–15cm, often several, simple or branched, with two opposite leaves below the inflorescence. Shade grown plants often with longer and more leafy stems, the upper leaves subopposite only. Radical leaves biternate or pinnate with ternately divided leaflets. Ultimate lobes linear-obovate to obovate, obtuse to acute, very variable. Cauline leaves like the radical, or sometimes smaller, rarely lacking. Racemes (1–)2–8-flowered, corymbose. Bracts linear to broadly flabellate-divided, very variable, shorter or often longer than the pedicels which are 10–30mm, erect and apically hooked in fruit. Flowers 14–20mm, greyish blue to very pale violet, very strongly scented, spongy, with short downwardly curved spur, usually broadly cristate and often with the crest

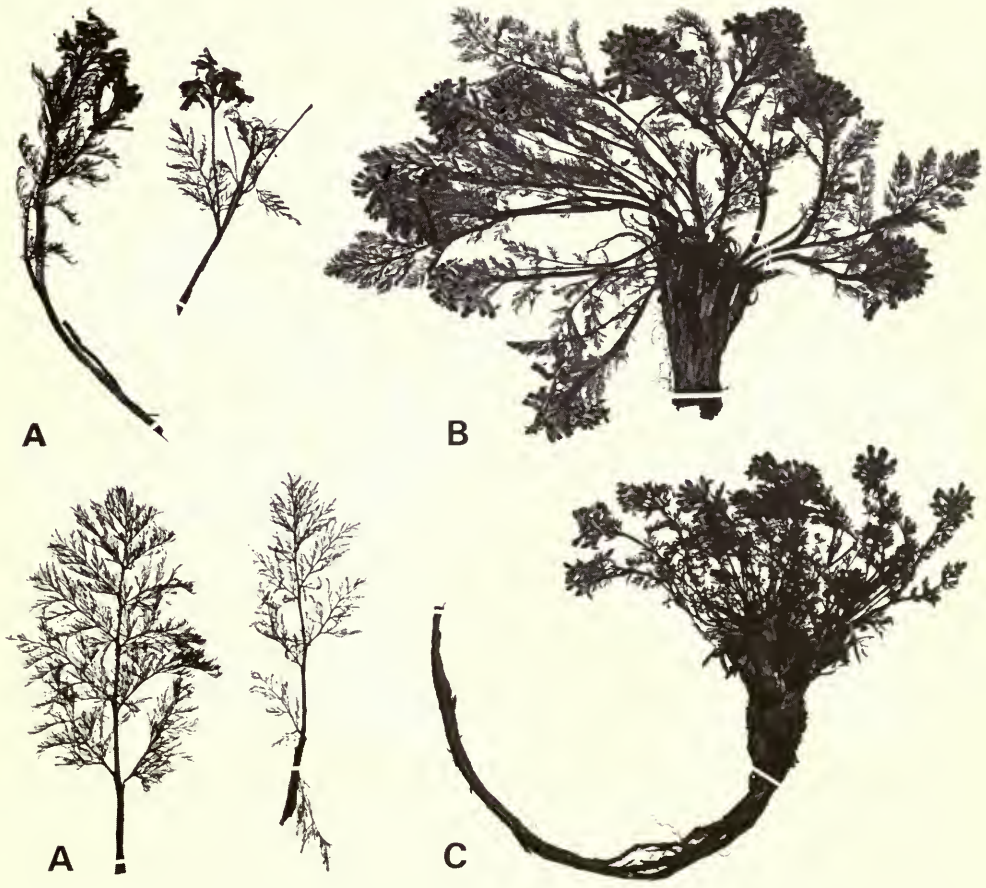


Fig. 9 A, B: *Corydalis meifolia* (A, *deHaas* 2214; B, *Stainton* 4759). C: *C. sikkimensis* (*Beer* 9555). × ¼.

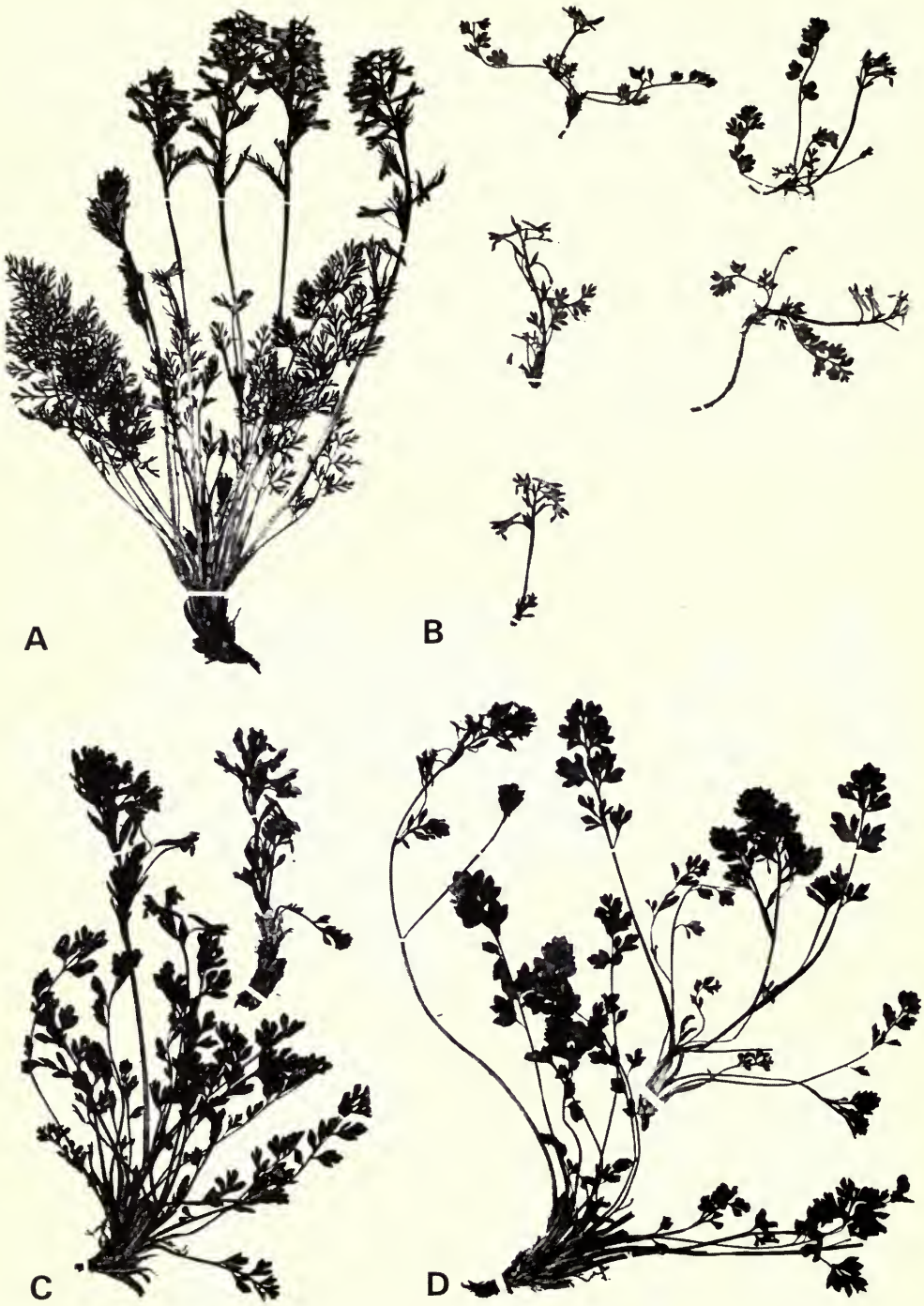


Fig. 10 A: *Corydalis govaniana* (*SSW* 245). B: *C. simplex* (type). C: *C. elegans* subsp. *robusta* (*PSW* 4633). D: *C. elegans* subsp. *elegans* (*Arnold* 136). × ¼.

decurrent to the apex of the spur, making the profile of the flower very broad. Upper petal with a notch behind the apex; keel green. Inner petals dark-tipped. Fruit *c.* 10 × 2–4mm, obovoid, 3–5-seeded, pendent on erect pedicels, explosively dehiscent. Style *c.* 3mm. Seeds *c.* 1·5mm, smooth in Nepalese specimens as far as noted. Self-sterile.

HABITAT. Rough, otherwise bare, screes; 4300–5500m.

DISTRIBUTION. West Nepal to Bhutan. 'Common in rough screes N. of Annapurna'.

1 July–27 August.

Einarsson et al. 2880 (BM); *Grey-Wilson & Phillips* 628 (BM, K); *Lowndes* 1304 (BM), 1316 (BM), 1330 (BM, KATH); *McBeath* 1428 (E); *Miehe* 364 (BM), 365 (BM), 540 (BM); *Joshi & Amatya* 73/721

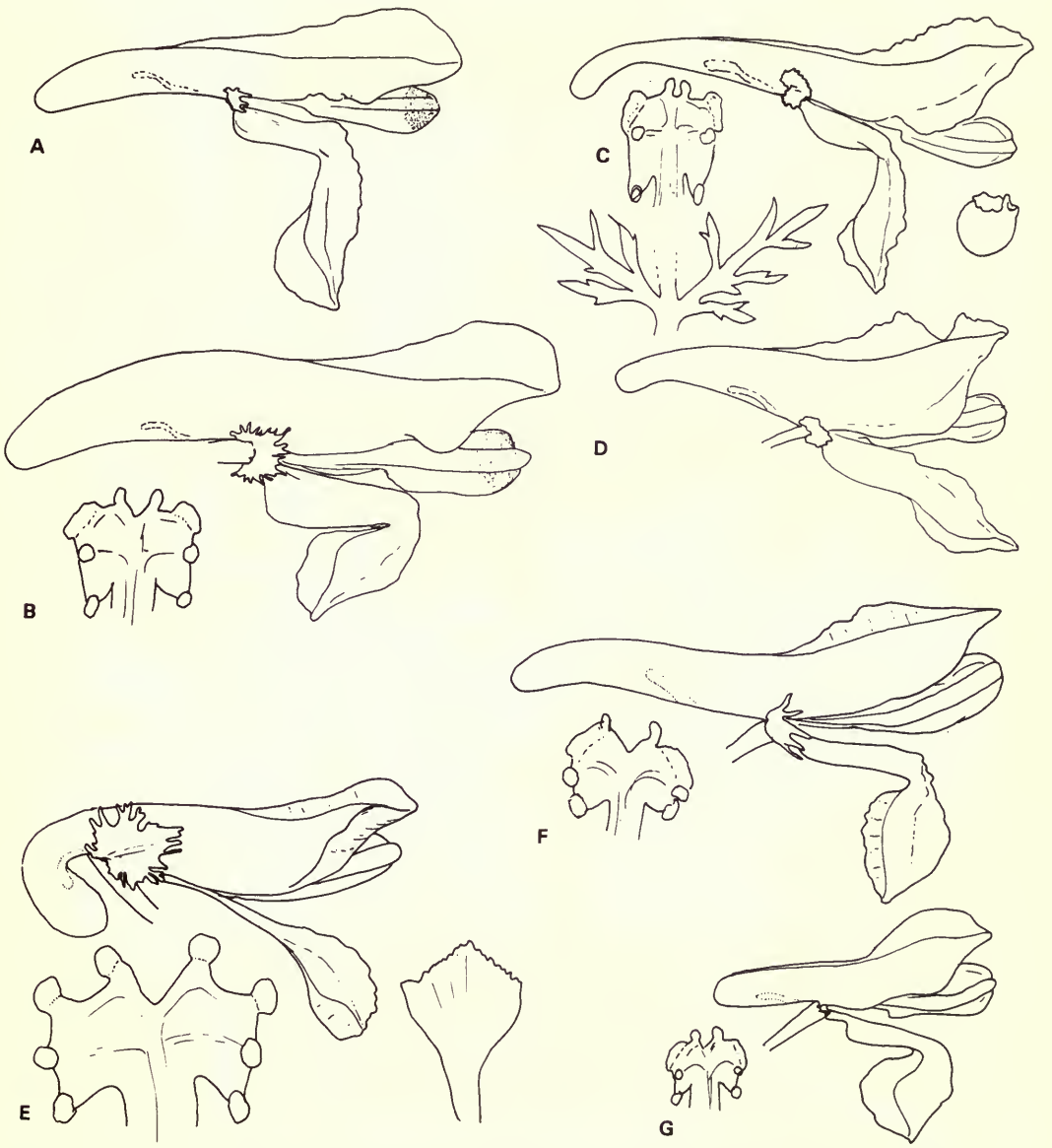


Fig. 11 A: *Corydalis elegans* subsp. *elegans* (*Shakya, Adhikari & Subedi* 8107). B: *C. elegans* subsp. *robusta* (*PSW* 425). C, D: *C. shakyae* (C, type; D, *Shakya, Adhikari & Subedi* 8022). E. *C. conspersa* (*SSW* 2316). F, G: *C. staintonii* (F, *Stainton* 5408; G, *PSW* 63). Flowers, stigmas, and (in C) bract and seed. For scales see Fig. 2.

Fig. 12 A: *Corydalis conspersa* (*SSW* 2316). B: *C. staintonii* (*Williams* 776). C, D: *C. shakyae* (C, type; D, *Shakya, Adhikari & Subedi* 8022). × ¼.

(KATH); *Joshi & Battacharya* 74/2309 (KATH); *Nakao* s.n. (BM, KI); *PSW* 46 (E, KATH), 236 (BM), 3532 (KATH); *Rajbandari, K. R.* 8232 (KATH), 8558 (KATH); *Shakya & Adhikari* 5276 (KATH); *Shrestha* 5280 (BM, KATH), 5341 (KATH), 5435 (KATH); *Smith* 11 (BM), 67 (BM); *Stainton* 5485 (BM, E, KATH), 5523 (E), 5570 (BM, E); *SSW* 1827 (BM, KATH), 1859 (BM), 2075 (BM, KATH), 2323 (BM, KATH). Cultivated in GBG.

Very variable in leaf shape, width of crests, division of bracts, etc. There is no strict geographic correlation, though specimens with undivided bracts and narrow leaflets seem to be more common east of Nepal. Small-flowered and large-flowered populations may occur close to each other. In two specimens from Sikkim (*Cooper* 863, 865, E) the seeds are dull, papillose. However, most specimens lack seeds. *Shrestha* 5280 and *Stainton* 5485 (Fig. 7B) from Toridwari Banjyang in west Nepal are notable for their extremely large flowers and small pinnate leaves.

10. **C. nana** Royle Map 5; Fig. 7C; 8B

Royle, 1833: 68. Type: Soongnum in Kunawur, *Royle* s.n. (K—holotype).
C. hoffmeisteri Klotzsch & Garcke, 1862: 129. Type: *Hoffmeister* 1845 (B—holotype).

Rhizome often long and slender. Stems 5–15 cm, simple or branched above, usually tapering below. Radical leaves bipinnate with leaflets dissected into linear-lanceolate, acute segments. Cauline leaves 3–4, the lower often subopposite, situated near the middle of the stem. Racemes dense, corymbose, 5–10-flowered, not overtopping the leaves. Bracts broadly flabellate, much dissected into linear segments, ± equalling the pedicels which are 15–25 mm, erect, apically hooked. Sepals *c.* 1 × 1 mm, apically dentate. Corolla greyish blue (according to Prain, 1896, not noted on Nepalese specimens), cristate, 15–16 mm, with a 4·5–6 mm long, somewhat downcurved spur. Lower petal broadly boat-shaped, except for the cristate deflexed

Fig. 13 A: *Corydalis uncinata* (*Stainton* 5547). B: *C. uncinatella* (type). × ¼.

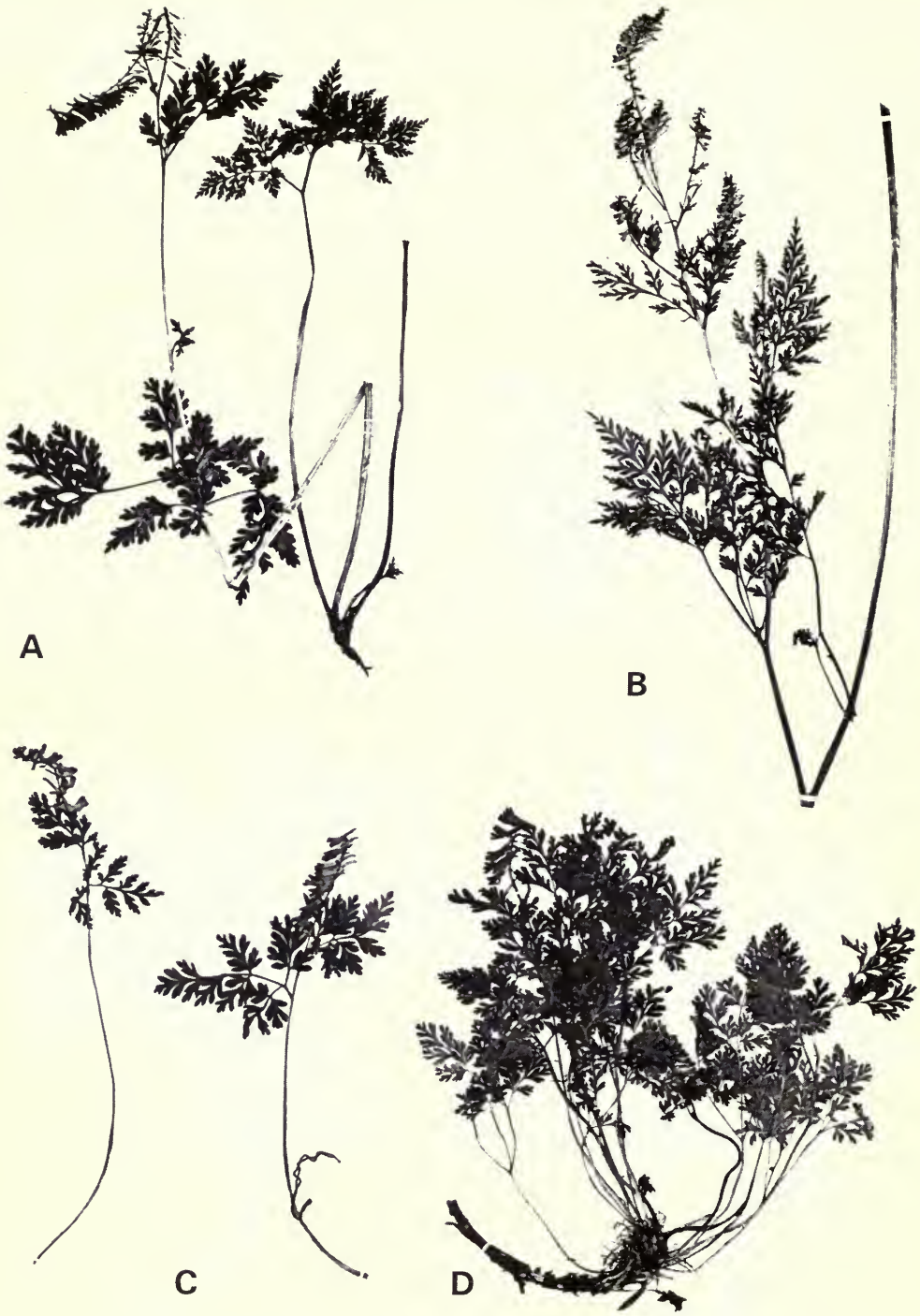


Fig. 14 A, B: *Corydalis chaerophylla* (A, *Shakya, Subedi & Uprety* 8403; B, *Stainton* 5584). C, D: *C. terracina* (C, *Dobremez* 77; D, type). × ¼.

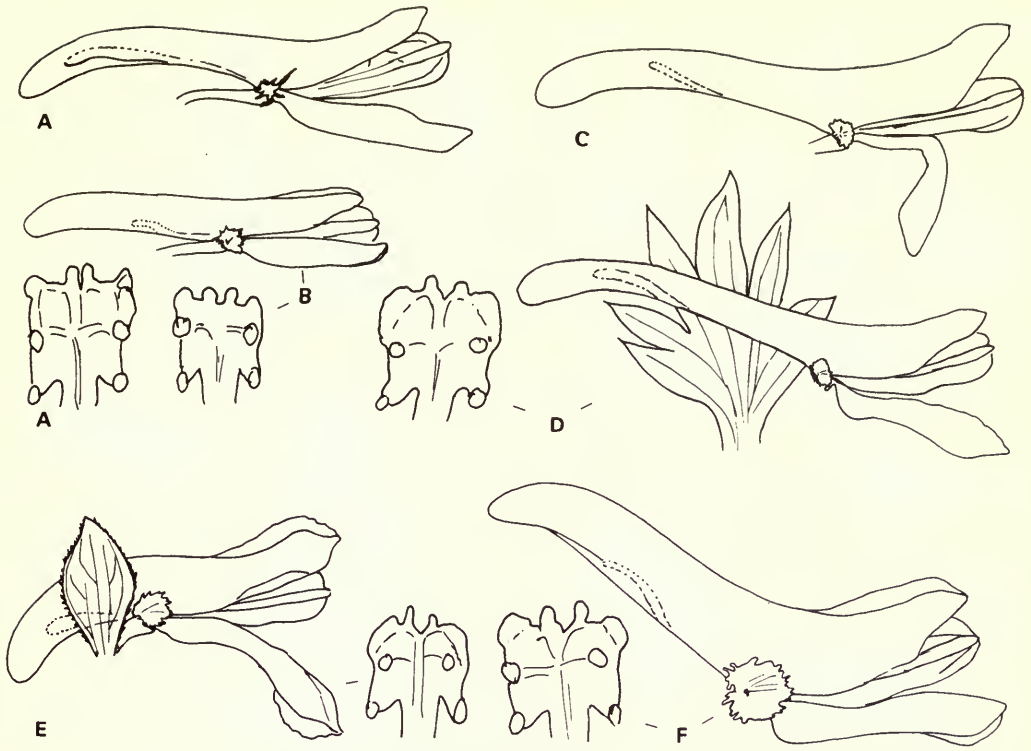


Fig. 15 A, B: *Corydalis chaerophylla* (A, *SSW* 4697; B, *Stainton* 1310). C, D: *C. geraniifolia* (C, *Beer* 9484; D, *Stainton* 1811). E: *C. stipulata* (type). F: *C. terracina* (*Dobremez* 77). Flowers, stigmas, and (in D, E) bracts. For scales see Fig. 2.

apex. Apex of inner petals dark. Fruit *c.* 6mm, narrowly obovoid, to 10-seeded. Style long, 3–3·5mm, sharply bent below stigma. Seeds small, to 0·8mm, smooth, shiny.

HABITAT. Bare screes; 4700–6100m.

DISTRIBUTION. Extreme west of Nepal, west Himalaya.

1 July–23 August.

Arnold 164 (BM); *Tyson* 69 (BM).

11. **C. stracheyi** Prain Map 6; Fig. 7D; 8E–F

Prain, 1896: 37. Type: Kumaon, Pindari, 3650m, *Strachey & Winterbottom* 9 (K).
C. nana var. *jaquemontii* Fedde, 1922: 29. Type: W. Himalaya, Hangarang, *Jacquemont* 729 (K—holotype).

Rootstock often very long, split into several firm strands, crowned by the withered remnants of leaf-sheaths and scales. Whole plant very glaucous with a wide lax rosette at base. Stems (10–)20–40cm, leafy, branched, slender, ascending. Leaves vaginate at base, ovate-triangular, ± equalling petioles; upper cauline leaves with short petioles. Lamina bipinnate with deeply divided leaflets. Segments narrowly linear to lanceolate. Racemes lax, 2–10-flowered. Upper bracts narrowly oblanceolate, entire, equalling or shorter than the pedicels. Lower bracts longer and often much divided. Pedicels 10–15(20)mm, recurved in fruit. Sepals 1–2 × 1–2mm, dentate. Coralla yellow, sometimes almost orange, with purplish brown and green markings on the keel of the upper petal and often on the spur, cristate, sometimes narrowly so, 12–14mm long with slender spur *c.* 4–5mm. Capsule *c.* 6mm long, broadly obovoid, 5–9-seeded, with *c.* 10 prominent veins, explosively dehiscent. Style 2–2·5mm, Seeds biseriate, 1·0–1·2mm, dull, minutely papillose.

Fig. 16 A: *Corydalis geraniifolia* (*Stainton* 1811). B, C: *C. stipulata* (B, *Polunin* 1629; C, type). × ¼.

HABITAT. Deeply rooted among boulders on alpine slopes, often close to running water; 3800–5000 m.

DISTRIBUTION. From west Himalaya to Bhutan. 'Around Poykotang'.

23 June–15 October.

Beer 8349 (BM), 9544 (BM), 10025 (BM), 10758 (BM); *Binns, Mason & Wright* 167 (BM, E); *Dhwoj* 43 (E), 300 (BM, E); *Dobremez* 357 (BM, KATH), 1684 (BM); *deHaas* 2203 (BM); *Kanai & Shakya* 672279 (KATH, TI); *Malla & Kanai* 674880 (TI), 674886 (TI); *Miehe* 4859, 6200, 8911, 10972 (GOET); *Polunin* 785 (BM), 1429 (BM); Langtang, *Poelt* s.n. (GZU); *PSW* 5365 (BM, E, KATH); *Shrestha & Joshi* 270 (BM, KATH); *Rajbandari, K. R.* 10077 (KATH); *Smith* 9 (BM); *Stainton* 849 (BM, KATH); *SSW* 6264 (BM, KATH), 6285 (BM); *Wigram* 121 (E); *Williams* 888 (BM, KATH). Cultivated in GBG.

12. **C. meifolia** Wallich — Map 7; Fig. 8H–I; 9A–B

Wallich, 1826: 55. Type: Nepal Himalaya, Gossain-Than, *Wallich* 1427 (K-W—holotype, E, K, S).
C. meifolia var. *sikkimensis* Prain, 1896: 40. Type: not designated.

Showy, very glaucous plant with very thick rootstock consisting of several twisted rope-like strands, apically with dense remnants of old leaf-bases with persistent fibrous veins. Stems 10–40 cm, leafy, simple or often branched above, erect. Lowermost cauline leaves situated near the middle of the stem, often subopposite. Basal leaves almost as long as the stems, with sheathing petioles about equalling the lamina. Lamina triangular to oblong, tripinnate, with numerous narrowly linear to filiform segments. Cauline leaves oblong, shortly petioled, bipinnate. Racemes very dense, corymbose, 12–35-flowered, elongating in fruit. Bracts oblong to flabellate, pectinately deeply cut into narrowly linear segments. Pedicels 10–30(–40) cm, erecto-patent, apically arcuate in fruit. Sepals 1–3 × 1–2·5 mm, dentate, or deeply lobed. Corolla yellow to orange, marked with purplish brown at base, 13–17 mm long, with spur 2·5–3 mm. Inner petals tipped with dark brownish purple. Outer petals broadly cristate. Fruit 8–9 mm, broadly elliptic, to 10-seeded. Style 3–4 mm. Seeds 1·2–1·3 mm, shiny, smooth.

HABITAT. 'Wet scree', 'Glacial grassland', 'Boulder slope, very wet'; 4000–5200 m.

DISTRIBUTION. Kumaon to Bhutan, widespread but scattered.

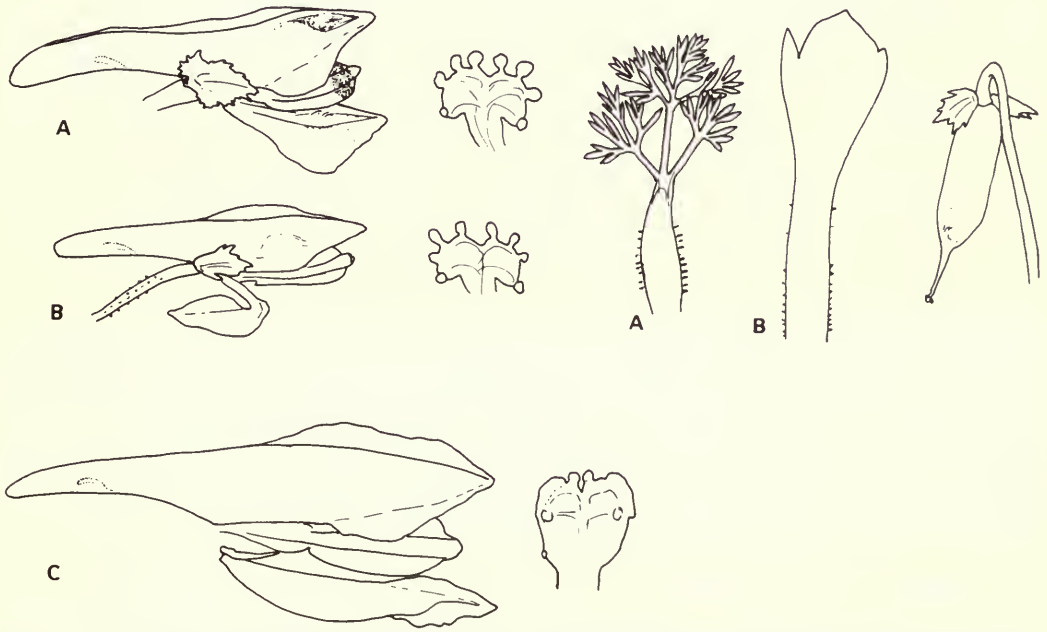
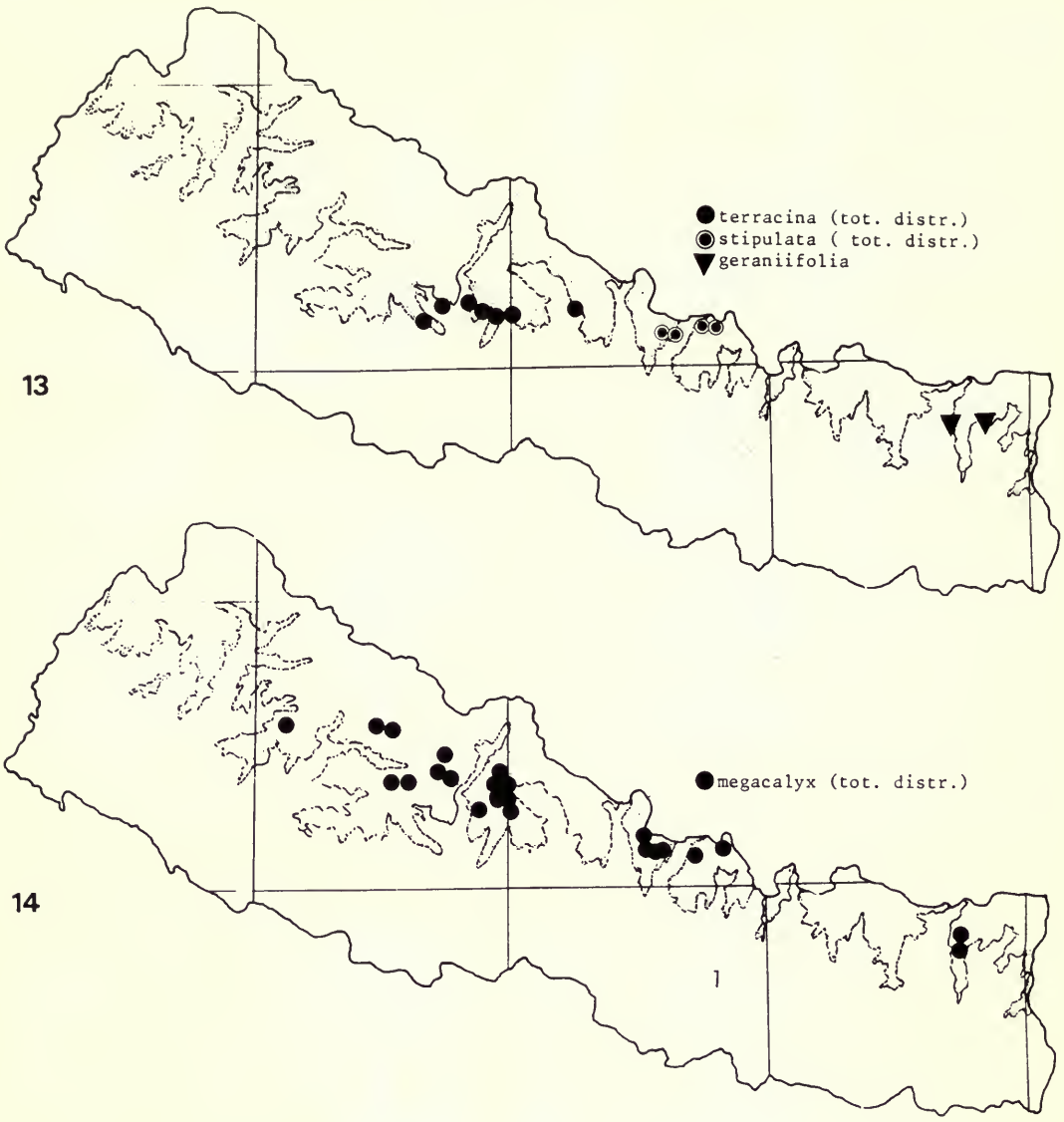


Fig. 17 A: *Corydalis megacalyx* (type). B: *C. clavibracteata* (type). C: *C. hendersonii* (*PSW* 34). Flowers, stigmas, and (in A, B) bracts, and (in B) fruit. For scales see Fig. 2.



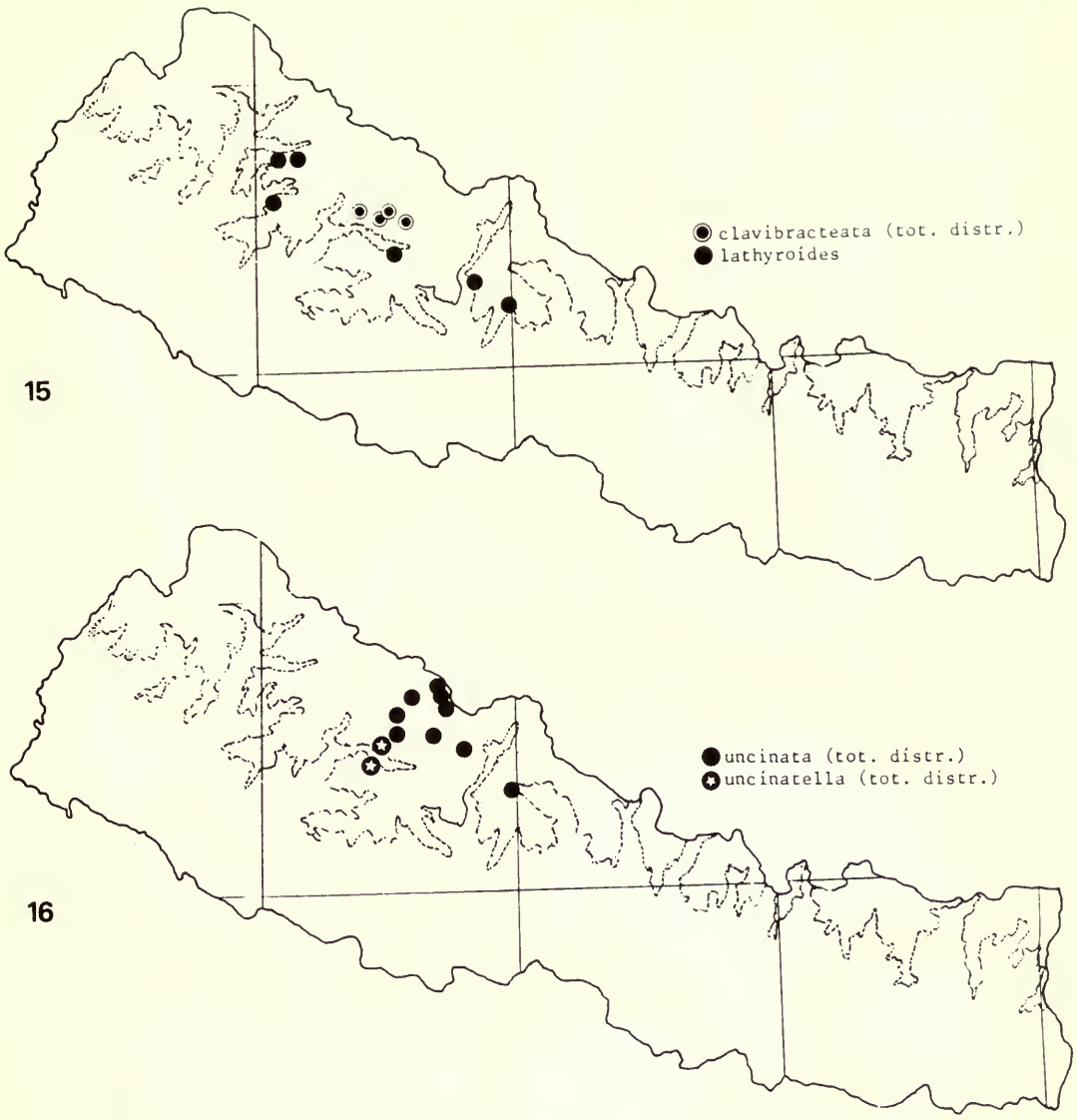
21 June–17 October.

Arnold 246 (BM); *Basukala* 6271 (KATH); *Beer* 9560 (BM); *Dhwoj* 5 (BM, E), 6 (BM, E), 42 (BM, E), 636 (BM, E); *deHaas* 2214 (BM), 2289 (BM); *Malla* 9538 (BM, KATH), 16216 (KATH); *Malla & Kanai* s.n. (KATH); *Miehe* 4901 (BM), 5392 (GOET), 5976 (GOET), 6115 (GOET, Xining), 6671 (GZU), 6832 (GOET), 8591 (GZU), 8605 (GZU), 8978 (BM), 12563 (Xining); *Polunin* 828 (BM), 1143 (BM); *PSW* 4809 (BM, KATH), 5393 (BM), 5397 (BM, E, KATH); *Rajbandari, K. R.* 10024 (KATH); *Shakya, Adhikari & Subedi* 8223 (KATH); *Sharma* 36/94 (BM); *Shrestha & Joshi* 471 (KATH); *Smith* 34 (BM), 99 (BM); *Stainton* 993 (BM, KATH), 4759 (BM); *SSW* 2360 (BM), 3216 (BM, KATH), 6286 (BM, E, KATH); 6294 (BM, E, KATH); *Tilman* s.n. (BM); *Wigram* 68 (E).

13. **C. sikkimensis** (Prain) Fedde — Map 10; Fig. 8G; 9C

Fedde, 1921: 201. – *C. duthiei* var. *sikkimensis* Prain, 1896: 33. Type: Sikkim, Tholoong, very high near the snow, May 1886, *King's collector* (K).

C. meifolia var. *sikkimensis* sensu Whitmore in Hara & Williams, 1979: 33 p.p., non Prain.



Rootstock long, rather thick apically, crowned by membranous (not fibrous as in *meifolia*!) old leaf-bases and cataphylls. Stems 10–15(–20) cm, leafy, simple, erect, with short dense racemes. Leaves bipinnate with dissected pinnulae. Ultimate leaf-lobes narrowly lanceolate, pointed, 3–4 × 1 mm. Basal leaves with long petioles; uppermost subsessile, similar to the lower bracts. Middle bracts smaller and less divided, longer than to equalling pedicels, uppermost bracts sometimes entire. Racemes 5–10-flowered, elongating in fruit. Pedicels 5–12 mm, deflexed in fruit. Sepals 1 × 1 mm, dentate. Corolla 15–16 mm long with spur 5–6 mm, broadly cristate, yellow. Fruit 8–9 mm, narrowly obovoid, 3–8-seeded. Style 3–4 mm. Stigma with basal papillae reduced. Seeds 1·0–1·3 mm, smooth.

HABITAT. 'Open wet rock scree'; 4250 m.

DISTRIBUTION. Sikkim and Bhutan, one record from Nepal.

Barun Khola, 4250 m, open wet rock scree, 9 August 1971, *Beer* 9555 (BM).

Fig. 18 A: *Corydalis hendersonii* (*PSW* 34). B: *C. megacalyx* (*Lowndes* 1256). C: *C. clavibracteata* (*Stainton* 5511). × ¼.

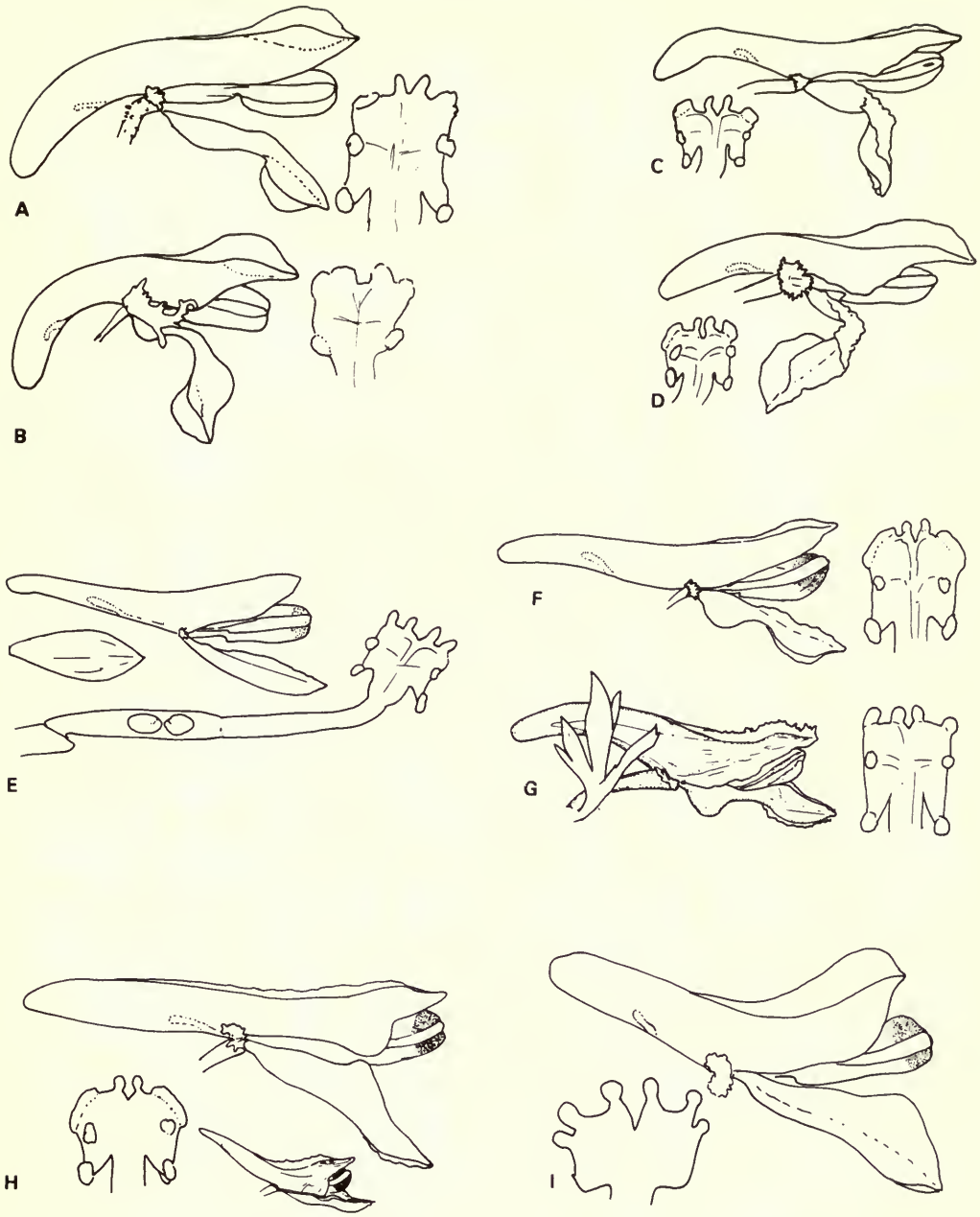


Fig. 19 A: *Corydalis uncinata* (type). B: *C. uncinatella* (type). C, D: *C. hookeri* (C, *PSW* 1435; D, *Stainton* 7153). E: *C. spicata* (type). F: *C. cornuta* (*PSW* 2507). G. *C. vaginans*. H: *C. filicina*. I: *C. cavei* (*Beer* 8394). Flowers, stigmas, and (in E) lower petal and ovary. For scales see Fig. 2.

Fig. 20 A: *Corydalis hookeri (Stainton* 7153). B: *C. spicata* (type). C: *C. vaginans* (*PSW* 5274). D: *C. cornuta* (*PSW* 2507). × ¼.

Fig. 21 A, B: *Corydalis cavei* (A, *Beer* 8394; B, *Stainton* 4751). C: *C. filicina* (*SSW* 6542). D: *C. lathyroides* (*PSW* 2454). × ¼.

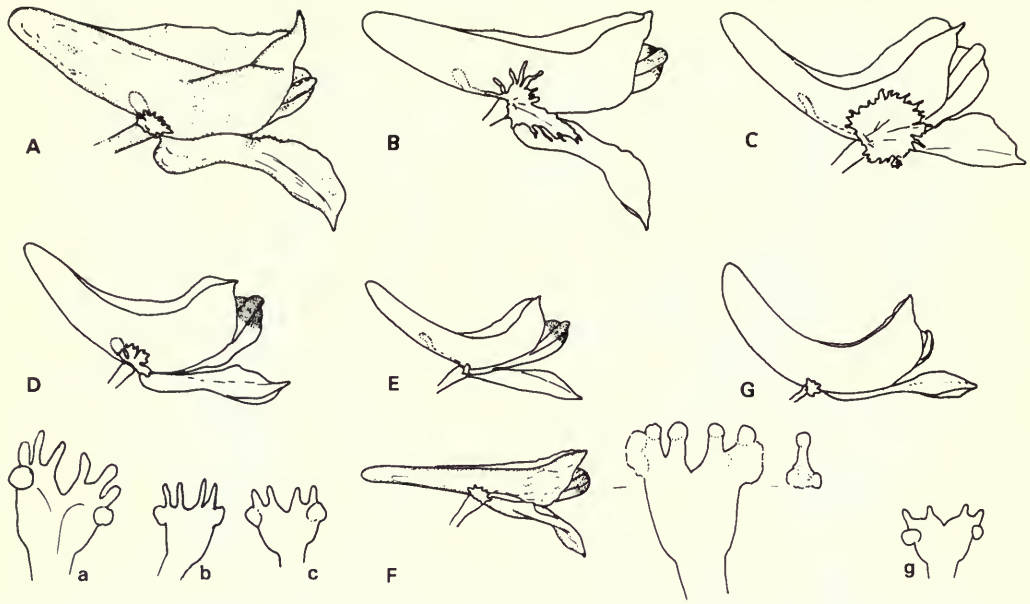


Fig. 22 A: *Corydalis longipes* (*Lidén* 85, Tibling W. of Pangsing Banyang, cult. in GBG). B: *C. filiformis* (*Shakya, Subedi & Uprety* 8425). C: *C. calycina* (type). D: *C. pseudo-longipes* (type). E. F: *C. casimiriana* (E, (?); F, *Lidén* 85, N. of Pangsing Banyang, cult. in GBG). G: *C. lathyroides* (*Shakya, Subedi & Uprety* 8531). Flowers and stigmas. For scales see Fig. 2.

14. **C. govaniana** Wallich Map 8; Fig. 8D; 10A

Wallich, 1826: 55. Type: Gahrwal, 1819, *Govan*, Wallich Cat. 1431 (K—lectotype).

Rhizome thick, fibrous, multistranded, densely crowned by the membranous remnants of old leaf-sheaths and cataphylls. Stems (10–)15–35(–50)cm, stout, naked or usually with two opposite leaves below the middle of the stem. Radical leaves ovate to triangular-ovate. Petiole sheathing at base, as long as or often shortern than the lamina, glabrous or finely puberulent with one-celled hairs at base abaxially (also the stems may sometimes be puberulent at base). Lamina bi-(tri-)pinnate with lanceolate ultimate lobes. Cauline leaves usually much smaller with vaginate bases. Racemes 10–25(–35)-flowered, dense, 5–15cm long. Bracts (10–)15–30mm, oblong, pectinate-incised, longer than the pedicels. Pedicels 10–20(–30)mm, arcuate-deflexed in fruit. Sepals 0·5–2 × 0·5–1·5mm, dentate. Flowers 17–22mm, yellow, broadly cristate with spur about half as long as remainder of corolla. Fruit *c.* 10mm, 4–7-seeded, obovoid. Style 3·5–4mm. Seeds 1·9mm, shiny. Self-sterile.

Habitat. By and just above the tree-line, slopes, often by track sides; 3000–4400m.

Distribution. NW. Himalaya to east Nepal. 'Poykotang'.

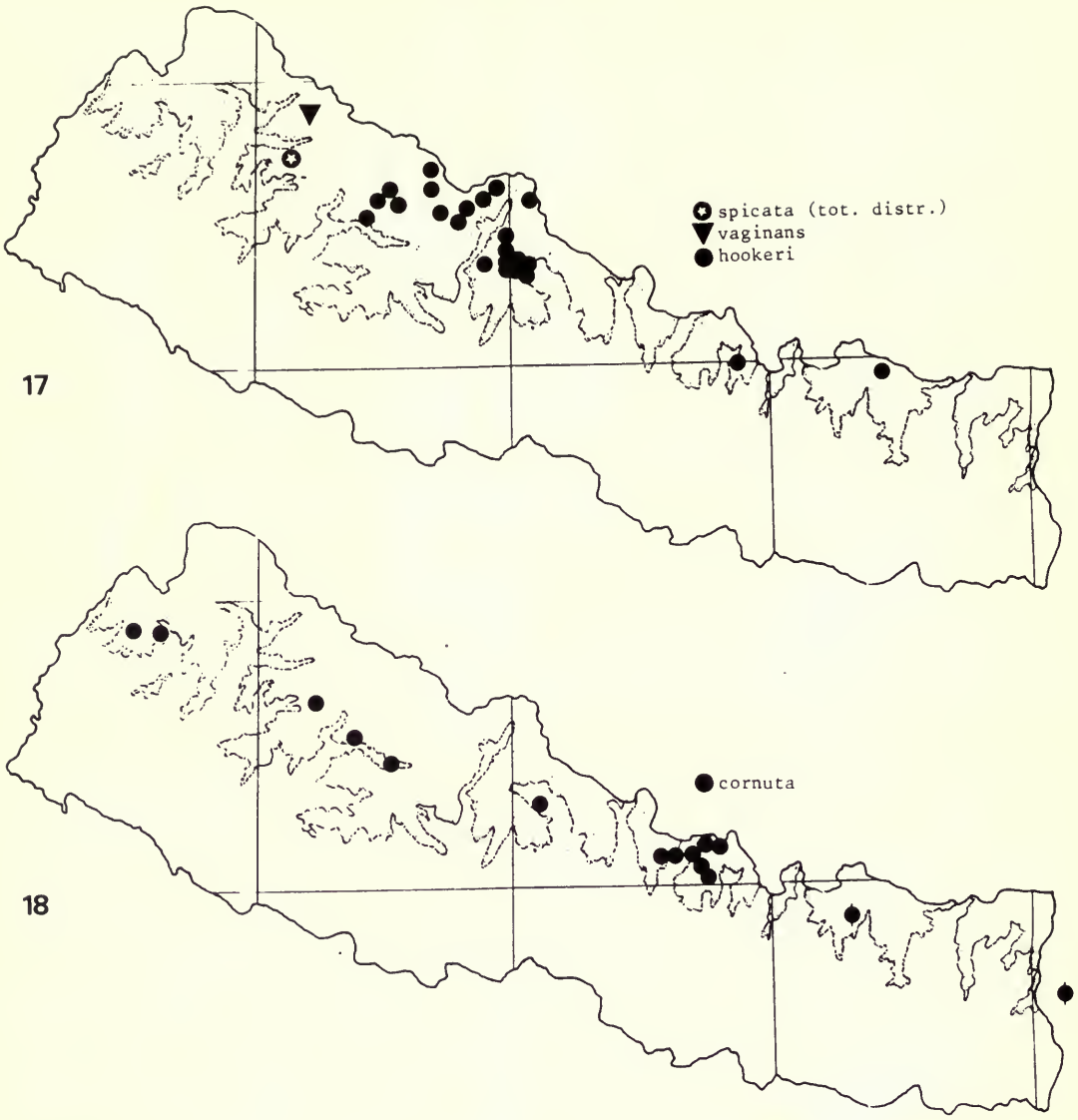
19 April–20 June(–13 August), spring-flowering.

Bailey 78 (BM), s.n. 'Ram gen, Tibet–Nepal border' (E); *Bowes Lyon* 151 (BM), 2006 (BM); *Dhwoj* 147 (BM, E); *Dobremez* 2074 (BM, KATH), 2200 (BM), 2324 (BM); *Einarsson* et al. 42a (BM), 433 (BM), 548 (BM), 700 (BM); *Fell* 22 (BM); *Gardner* 467 (BM); *Manandar & Joshi* 6594 (KATH); *Maser* 137 (BM); *McCosh* 156 (BM, E); *Miehe* 296 (BM)?, 2447 (GZU); *PSW* 172 (BM), 418 (BM, KATH), 2055 (BM, E, KATH), 4078 (BM, KATH), 4673 (BM, KATH); *Rao* 14189 (KATH); *Stainton* 562 (BM), 2927 (KATH), 4672 (BM), 4882 (BM, KATH), 8138 (KATH); *Shrestha* 2927 (KATH), 4129 (KATH), 8138 (KATH); *SSW* 245 (BM, KATH), 1010 (BM, KATH), 2652 (BM, E, KATH), 6397 (BM); *Tyson* 24 (BM). Cultivated in GBG.

15. **C. simplex** Lidén, **sp. nov.** Map 9; Fig. 8C; 10B

Herba perennis. Rhizoma elongatum quam in *C. govaniana* tenuior basibus petiolorum vetustorum squamatum instructum. Folia rosulata petiolata subtus glauca verosimiliter carnosa pinnata, foliolis

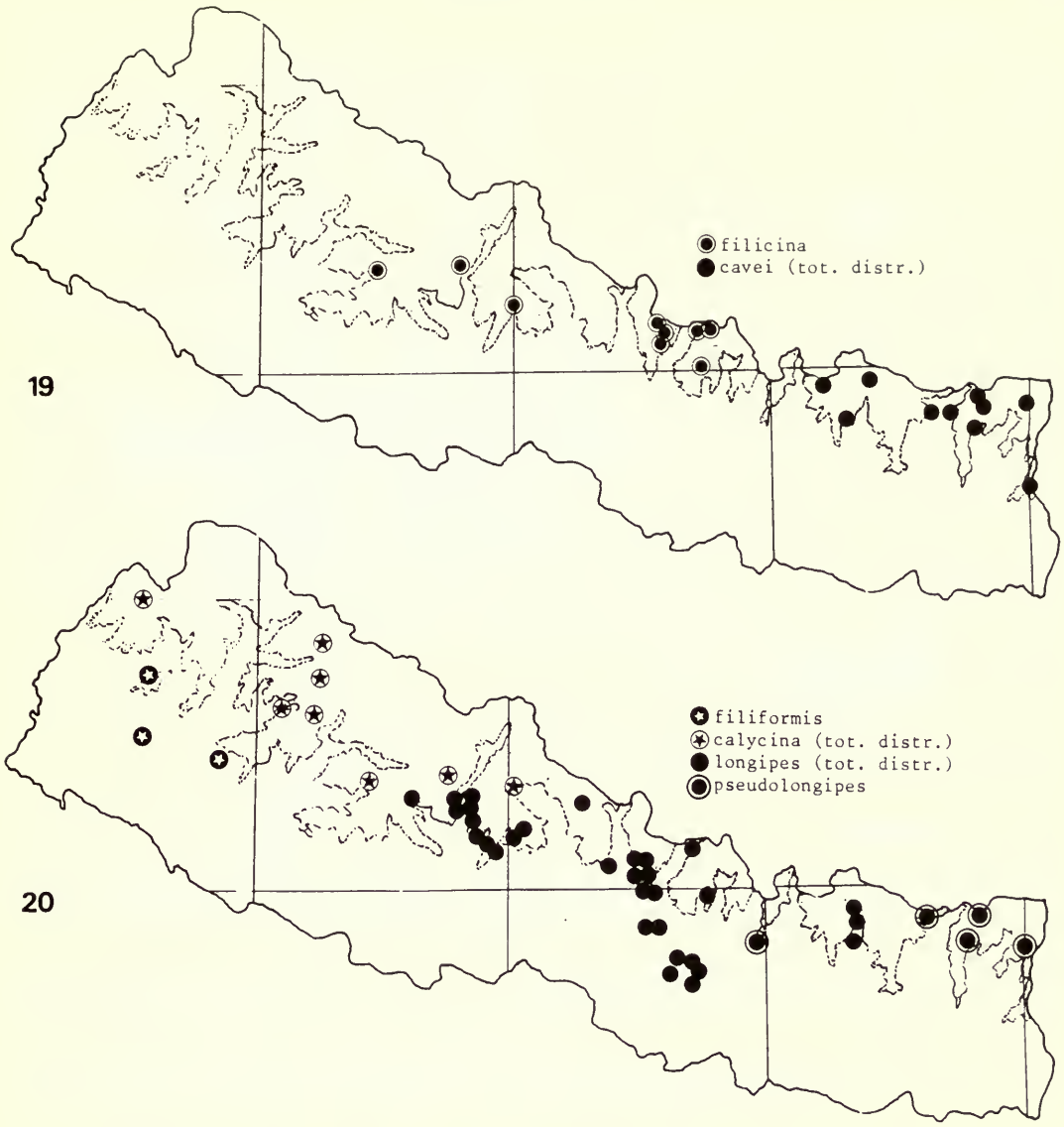
Fig. 23 A: *Corydalis longipes* (*Maire* 338). B: *C. filiformis* (*Bista & Joshi* 513). C: *C. calycina* (*PSW* 5438). D: *C. pseudolongipes* (type). E, F: *C. casimiriana* (E, *SSW* 3871, eastern form); F, *Shakya, Subedi & Uprety* 8744, western form). × ¼.



profunde incisis segmentis late ellipticis vel obovatis mucronatis. Caulis simplex 6–15cm altus aphyllus vel saepe basin versus duobus foliis parvis oppositis ornatus. Racemi 4–11-flori, densiusculi, fructu elongati. Bracteae lanceolatae integrae 10–18mm longae. Pedicelli arcuato-recurvati, 8–15mm longi, fructiferi ad 20–25mm longi elongati. Flores lutei. Sepala parva, parce dentata. Petalum superius cristatum acutum 16–18mm longum calcaribus 8–10mm longis inclusum. Petalum inferius basin non saccatum. Aliter ut in *C. govaniana.*

Type: W. Nepal, Jangla Banjyang, 4300m, 12 vii 1973, *Einarsson, Skärby & Wetterhall* 1970 (BM—holotype).

Similar to *C. govaniana* in detail, but with a very different habit; much smaller with less divided, somewhat fleshy leaves which are glaucous beneath. Rhizome narrow, not split with age, scaly. Stems few, simple, 6–15cm, usually with a pair of small opposite leaves near the base. Leaves pinnate with deeply divided leaflets. Ultimate lobes broadly lanceolate to obovate, mucronate. Racemes 4–11-flowered, rather dense, laxer in fruit. Bracts lanceolate,



entire, equalling to shorter than the arcuate-recurved pedicels, which are 8–15 mm, elongating to 20–25 mm in fruit. Flowers as in *C. govaniana* but smaller, 16–18 mm long, and lower petal lacking a basal pouch.

HABITAT. grassy slopes; 4000–4500 m.

DISTRIBUTION. Nepal Himalaya west of Annapurna.

14 June–21 July.

Einarsson et al. 1970 (BM); [*Miehe* 296 (BM)?]; *PSW* 3109 (BM); *SSW* 2343 (BM, E); *Synge & Barclay* 2492 (BM, K).

This was named *C. pachypoda* (Franchet) Hand.-Mazz. (= *C. tibetica* var. *pachypoda* Franchet) by Ludlow, but differs in several characters. The closest relative seems to be *C. swatensis* which, however, has narrow leaflets and a pouch to the lower petal.

16. **C. elegans** Hook. f. & Thomson

Hooker & Thomson, 1855: 265. Type: Kumaon, *Blinkworth*, Wallich cat. 1435 (K—lectotype, BM, E, K–W).

Flowers 24–26mm ..... subsp. **robusta**
Flowers 20–22mm ..... subsp. **elegans**

16a. subsp. **robusta** Lidén, **subsp. nov.** Map 10; Fig. 10C; 11B

Tota planta robustior, pedunculi breviores, bracteae et pedicelli longiores, flores majores. Aliter ut in subsp. *elegans*.

Type: West Nepal, Bhurchula Lekh S. of Jumla, 4120m, 13 vii 1952. 'Growing on open slopes. Leaves and bracts glaucous green. Perianth yellow. Lateral lobes dark brown towards apex, actual apex yellow', *Polunin, Sykes & Williams* 4633 (BM—holotype, KATH, E).

Rhizome thick, crowned by membranous scales and withered leaf bases. Stems robust 10–25cm with a lax raceme *c.* 10cm long. Most leaves basal, 6–20cm long, with ovate lamina ± equalling petiole, pinnate with deeply divided leaflets, very glaucous. Ultimate lobes broadly obovate-acute. Racemes 11–17-flowered, dense at anthesis, elongating in fruit. Bracts large, broadly lanceolate, the lowermost sometimes divided; lower bracts longer, uppermost ones shorter, than the long arcuate fruiting pedicels that reach 3–5cm. Sepals 2 × 2–3mm, fimbriate-dentate. Corolla 24–26mm with spur about half as long, yellow, broadly cristate with inner petals tipped dark purplish brown. Lower petal with a conspicuous pouch. Fruit (immature) 10–12mm, broadly oblanceolate. Style 3–4mm long. Seeds unknown.

Habitat. 'Open slopes'; 2700–3500m.

Distribution. West Nepal, Jumla area, endemic.

13 July–13 August.

Manandhar & Joshi 6653 (KATH); *PSW* 425 (BM), 4633 (BM, E, KATH).

16b. subsp. **elegans** Map 10; Fig. 10D; 11A

Differs from subsp. *robusta* in the more slender habit with longer peduncles, smaller bracts, pedicels, and flowers, and in the often obtuse leaflets; sepals 1 × 1mm, deeply dentate; style 6mm long.

Habitat. Open slopes, 4000–4500m.

Distribution. Extreme west of Nepal, Kumaon.

25 July–26 August.

Arnold 136 (BM); *Bista & Joshi* 625 (KATH); *Shakya, Adhikari & Subedi* 8076 (KATH), 8107 (KATH).

17. **C. staintonii** Ludlow Map 11; Fig. 11F–G; 12B

in Ludlow & Stearn, 1975: 65. Type: Toridwari Banjyang (28° 50′ N., 82° 42′ E.), 3800m, 31 July 1966, *Stainton* 5484 (BM—holotype, E).

C. chasmophila Ludlow, 1975: 52; Whitmore in Hara & Williams, 1979: 35. Type: Jangla Banyang (28° 50′ N., 82° 57′ E.), 4000m, on limestone rocks, 30 May 1966, *Stainton* 5408 (BM—holotype, E).

C. sykesii Ludlow, 1975: 66; Whitmore in Hara & Williams, 1979: 35. Type: Above Sauwola Khola (28° 39′ N., 83° 12′ E.), 4250m, 5 June 1954, *Stainton, Sykes & Williams* 2999 (BM—holotype, E, KATH).

A densely tufted perennial with a branched fibrous rootstock apically crowned by straw-like persistent leaf-bases. Stems often many, 4–13(–18)cm, leafless or with 1–3 leaves. Basal leaves about as long as the stems, oblong, with petiole equalling or longer than lamina, pinnate with 2–5 pairs of leaflets. Leaflets small, sub-biternate to sub-pinnatisect or deeply cut into 3–6 small obovate segments. Stems 2–12(–17)-flowered, lax, flowers borne along most of the stem. Lower bracts entire, or often pinnatisect, upper usually entire, 10–30mm. Pedicels very long, 30–80mm, apically arcuate, erecto-patent in fruit. Sepals (0·5–)1–2mm, deeply dentate. Corolla 14–25mm including spur 6–13mm, yellow with brown tips, cristate. Lower petal with

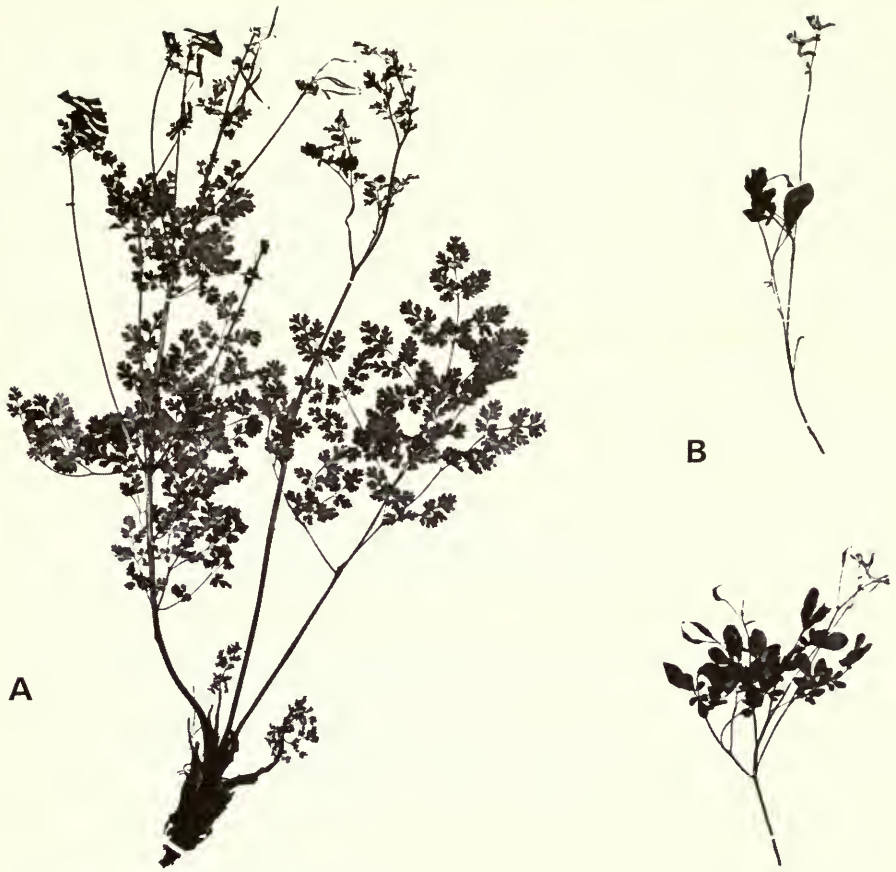


Fig. 24 A: *Corydalis flaccida* (*Williams* 845). B: *C. diphylla* (*PSW* 846). × ¼.

deflexed apex. Fruit 14–20mm, linear to narrowly lanceolate, up to 15-seeded. Style 3–4mm. Seeds (immature) 0·8mm.

HABITAT. Cliff crevices, wet slopes; 3600–5300m.

DISTRIBUTION. West Nepal to Bhutan (only Nepalese specimens seen).

30 May–5 July.

Bowes-Lyon 2163 (BM); *Polunin* 190 (BM); *PSW* 63 (BM, E), 1528 (BM); *Shrestha* 5298 (BM); *Stainton* 638 (BM, E), 5408 (BM), KATH), 5484 (BM, E, KATH); *SSW* 2999 (BM, E); *Williams* 776 (BM).

Very variable. *PSW* 63 deviates in its numerous, only 14mm long, flowers in umbellate racemes, and very small sepals. The type specimen (and *Shrestha* 5298) provides the other extreme with a 25mm long corolla with a broad upwardly curved spur.

18. **C. shakyae** Lidén, **sp. nov.** Map 11; Fig. 11C–D; 12C–D

Herba ad 40cm alta (?). Caules ramosi plus minus flexuosi. Folia 3–4-ternata vel sub-pinnata segmentis ultimis anguste lanceolatis acuminatis. Racemi 5–14-flori. Bracteae profunde lobatae lobis angustis plus minusve dentatis. Pedicelli arcuati, 7–10mm longi. Sepala reniformia dentata, 1–1·5mm. Corolla 18–22mm longa, calcari 10–11mm longo attenuato incluso, flava, petalis interioribus ad apicem fuscoviolaceis. Petala exteriora late cristata crista erosa. Fructus (immaturus) obovatus, 8–10mm longus, 6–7-ovulatus stylo 3·5-4mm longo instructus.

Type: West Nepal, Mechchra, Darchula district, *c.* 29° 45′ N., 81° 05′ E., 3640m, 23 vii 1974, *Shakya, Adhikari & Subedi* 8044 (KATH—holotype).

To 40cm long (?, basal parts unknown). Stems leafy, zigzagged, branched. Leaves 3–4 times ternate to sub-pinnate with divided leaflets. Lower petioles often longer than lamina, upper much shorter. Ultimate leaf-segments narrowly oblanceolate to oblong with acuminate apices. Racemes 5–14-flowered, 2–6cm long with a usually short peduncle. Bracts deeply divided with narrow, irregularly divided or dentate segments, progressively smaller upwards, glabrous. Pedicels 7–10mm, about as long as the bracts, arcuate, more recurved in fruit. Sepals reniform, dentate, *c.* 1·5mm. Corolla yellow with brownish green keel to the upper petal and dark apices to the inner petals, 18–22mm long. Outer petals with broad, eroded crests. Spur of upper petal 10–11mm, tapering, slightly curved downwards, with nectary about 2/5 as long. Fruit (immature) 8–10mm with 5–7 ovules, obovoid, abruptly narrowed into a long style 3·5–4mm. Mature capsules 2–6-seeded. Seeds glossy, 1·5–2mm. Stigma ± square with prominent basal horns.

HABITAT. 'Open subalpine steep slope, on rock crevices'; 3600–3900m.

DISTRIBUTION. West Nepal, Mechchra, Darchula district; Kumaon (above Budhi, 3200m, 22 July 1886, *J. R. Reid* s.n., E).

22 July–23 July.

Shakya Adhikari & Subedi 8022 (KATH), 8044 (KATH), 8076 (KATH).

Description of mature seeds taken from Reid's specimen. The west Himalayan *C. thyrsiflora* Prain and *C. pakistanica* Jafri are probably the closest relatives.

19. **C. uncinata** Lidén, **sp. nov.** Map 16; Fig. 13A; 19A

Herba valde glauca, verosimiliter carnosa. Caules foliati ramosi. Folia caulina plura, pinnata, segmentis ultimis late obovatis, saepe imbricatis. Racemi 5–10-flori, densi. Bracteae late ellipticae, 15–25 × 5–11mm alabastra abscondentes. Pedicelli fructiferi valde elongati, erecti, apice uncati. Flores lutei, 15–17mm longi cum calcari 7–8mm. Petala exteriora cristata. Fructus elliptici ad obovati, 10 × 3·5mm, penduli, 6–10-spermati. Stylus 2·5mm. Semina 1·6mm, nitida.

Type: West Nepal, Phoksumdo Tal, 29° 05′ N., 82° 57′ E., 3650m, 11 vii 1966, *Stainton* 5508 (BM—holotype, KATH).

Very glaucous and apparently fleshy. Stems 7–20cm, leafy, branched, arising from a vertical, often branched rhizome with some remnants of leaves and cataphylls at apex. Most leaves cauline, ovate, pinnate, with lamina equalling the slightly vaginate petiole. Leaflets pinnatifid to variously lobed with ultimate segments broadly obovate, often imbricate. Racemes 5–10-flowered, very dense at anthesis, elongating in fruit. Bracts 15–25 × 5–11mm, broadly elliptic, large, concealing the buds. Pedicels much lengthening in fruit to 20–30mm, erect, apically hooked like a shepherd's crook, often papillose towards the apex. Flowers dull yellow with greenish grey veins, inner petals dark at apex. Sepals small, less than 1mm. Corolla 15–17mm with slightly downwardly curved spur 7–8mm long. Outer petals cristate. Fruit 10 × 3·5mm, elliptic to obovoid, pendent, 6–10-seeded. Style 2·5mm. Seeds 1·6mm, shiny.

HABITAT. 'scree', 'wet shaly slope', 'margin of field by irrigation channel'; 3650m–5300m.

DISTRIBUTION. Endemic to Dolpo in west Nepal.

24 June–27 August.

Grey-Wilson & Phillips 480 (BM, K), 536 (BM, K); *Lowndes* 1232 (BM); *Miehe* 540 (BM); *PSW* 1200 (BM); *Shrestha* 5416 (KATH); *Stainton* 4382 (BM), 5508 (BM, E, KATH), 5535 (BM, E), 5547 (BM).

20. **C. uncinatella** Lidén, **sp. nov.** Map 16; Fig. 13B; 19B

Affinis *C. uncinatae* Lidén sed differt statura minore, foliis minoribus minus carnosis, lobis ultimis angustioribus non imbricatis, bracteis flabellatis ± incisis, floribus et fructibus minoribus sepalis majoribus.

Type: West Nepal, Toridwari Banjyang, 28° 50′ N., 82° 42′ E., 3800m, 3 vii 1966, *Stainton* 5481 (BM—holotype, E).

Similar to a miniature, less fleshy *C. uncinata*, but a scree-plant with long slender rhizomes.

Aerial parts of stems to 10cm, branched, leafy. Leaves much smaller than in *uncinata*; lamina about as long as the somewhat vaginate petiole, 3–4cm, similar to the *uncinata*-leaf, but ultimate lobes narrower, discrete, not imbricate. Racemes 2–9-flowered, dense, slightly elongating. Bracts to 15mm long, flabellate, deeply lobed, or the uppermost entire, concealing the buds, ± equalling the erect, apically hooked fruiting pedicels. Sepals 2mm long, irregularly dentate, broadly acuminate, comparatively much larger than in *uncinata*. Corolla 13–14mm, with downwardly curved spur. Fruit as in *uncinata* but smaller and narrower. Stigma with rudimentary basal papillae.

HABITAT. sandy scree; 3600–3800m.

DISTRIBUTION. Endemic to Toridwari Banjyang near Jumla.

3 July–12 July.

Shrestha 5360 (BM, KATH); *Stainton* 5481 (BM, E).

21–24. **C. chaerophylla** complex Map 12–13; Fig. 14–16

Medium to tall perennial herbs, glabrous to crispate-puberulent. Rootstock reddish when dry. Radical leaves rather large, triangular in outline, ternately divided. Leaflets pinnate to bipinnate with coarsely dentate lobes, often decurrent on rachis. Cauline leaves smaller, becoming sessile upwards, confined to the middle and upper parts of the stem. Stems solitary to few, simple or branched above. Racemes simple to much-branched, few- to many-flowered, rather dense, spicate, usually secund, 6–40-flowered. Bracts usually small, linear to ovate, entire, or in *C. geraniifolia*, larger and deeply divided. Pedicels 4–5mm long, deflexed in fruit. Flowers yellow, often with brownish veins. Fruit 8–10mm, obovoid to oblanceolate, 5–11-seeded, with style *c.* 2–2·5mm, explosively dehiscent. Seeds uni- to biseriate, 0·9–1·9mm, shiny.

A difficult complex from a taxonomic point of view, widespread in humid parts of Himalaya. In Nepal four species are distinguished: *C. chaerophylla* s.str. which is widespread in forests throughout Nepal, often close to running water; *C. geraniifolia* which occurs from east Nepal to Bhutan in margins and clearings of humid forests; *C. terracina*, locally common on the south side of Annapurna, usually growing on terrace banks or by roadsides; and *C. stipulata*, found by streams in the forests of the Langtang area in central Nepal. *C. borii* is a related species from east Himalaya.

C. chaerophylla and *terracina*, which look distinct in the field, can sometimes be difficult to distinguish in the herbarium, and the habit, the habitat, and the flower-colour should be noted.

21. **C. chaerophylla** DC. Map 12; Fig. 14A–B; 15A–B

DeCandolle, 1821: 128. Type: Nepal, *Wallich* (G—holotype, BM, E, K, K-W).

Tall herb, 60–100(–130)cm, glabrous to crispate-puberulent below. Stems naked below, leafy and branched above. Basal leaves few, large with long petioles, lamina with much divided leaflets and ultimate lobes rather deeply cut, whole leaf somewhat fern-like. Racemes simple and few-flowered to much-branched and showy, 6–40-flowered, dense at anthesis, somewhat elongating in fruit, secund. Bracts small, linear to narrowly ovate, entire. Flowers pale yellow, usually without brownish veins, 16–20mm including long spur, usually narrowly cristate. Lower petal without a prominent basal pouch. Seeds 0·9–1·4mm.

HABITAT. In forests and clearings, often close to running water; 1800–3400(3800?)m.

DISTRIBUTION. Kumaon to east Himalaya. 'Common in *Rhododendron* forest S. of Annapurna'.

30 April–12 November.

Banerji & Shakya 5602 (KATH); 9484 (K), *Beer* 9528 (BM), 25678 (BM); *Dhwoj* 135 (E), 153 (BM), 177 (BM, E); *Dobremez* 304 (BM); *Flatt* 157 (BM); *Ms Gurung & Pradhan* 10564 (KATH); *deHaas* 2158 (BM), 2710 (BM); *Hara* et al. 6302866 (KATH); October 1978, *Idzumi & Togasho* (TI); *Kanai* 673881

(KATH, TI); *Kanai, Murata* et al. 1175 (TI); *Kanai & Shakya* 672378 (KATH); *Malla* 4862 (KATH),26152 (KATH); *Malla, Shrestha & Rajbandari* 13823 (KATH); *Manandar* 101 (KATH), 7093 (KATH); *Manandar & Batterai* 8929 (KATH), 8951 (KATH); *Manandar & Joshi* 6425 (KATH), 6527 (KATH); *McCosh* 266 (BM, KATH); *Miehe* 758 (BM); *Nicolson* 2260 (BM, KATH), 2748 (KATH); *Polunin* 1796 (BM); *PSW* 4861 (BM, E, K, KATH), 5468 (BM), 5593 (BM, KATH); *Rajbandari* 13823 (KATH); *Rajbandari & Roy* 2189 (KATH); *Schilling* 608 (K,KATH); *Shakya, Subedi & Uprety* 8403 (KATH); *Shrestha* 1961 (KATH), 2713 (KATH); *Shrestha & Bista* 1704 (KATH); *Shrestha & Joshi* 476 (KATH); *Stainton* 626 (BM, KATH), 1310 (BM, KATH), 4931 (BM), 5104 (BM, KATH), 5584 (KATH); *SSW* 332 (BM, KATH), 1663 (BM), 1979 (BM), 3267 (BM, KATH), 3542 (BM, KATH), 4697 (BM), 6515 (BM, KATH), 7401 (KATH), 8519 (BM, E, KATH), 8568 (BM); *P. N. Suwal* et al. 907 (KATH). A low-growing robust form from below Pangsing Banyang is cultivated in GBG.

Quite variable. In west Nepal there is a form with a 20mm long corolla and deeply dentate, long-acuminate sepals (*PSW* 4861, 5468; *SSW* 3267, 4697). The common form with flowers 16–19mm in many-flowered branched racemes is scattered throughout Nepal.

22. **C. geraniifolia** Hook. f. & Thomson — Map 13; Fig. 15C–D; 16A

Hooker & Thomson, 1855: 269; *C. chaerophylla* var. *geraniifolia* (Hook. f. & Thomson) Hara, 1966: 103. Type: Sikkim, 2440–2740m, *Hooker & Thomson* (K).

Similar to *C. chaerophylla* but racemes lax, 10–15-flowered, frequently branched at base. Bracts 7–10(–15)mm, usually deeply divided, or the upper ovate, entire. Corolla 22–23mm, ecristate, with long, apically recurved spur.

HABITAT. Margins and clearings in humid forests, 2440–3300m.

DISTRIBUTION. East Nepal to Bhutan.

27 July–13 August (17 November–3 December, fruiting specimens).

Beer 9484 (BM); *Hara, Kanai* et al. 6302870 (TI, fruiting specimen); *Kanai, Murata* et al. 6302871 (TI, fruiting specimen); *Stainton* 1811 (BM, KATH).

23. **C. terracina** Lidén, **sp. nov.** — Map 13; Fig. 14C–D; 15F

Affinis *Corydali chaerophyllae* DC. sed differt habitu humiliore robustiore, caulibus paucifoliatis non ramosis, sepalis majoribus, floribus majoribus fusco-luteis petalo inferiore ad basin saccato, seminibus majoribus.

Type: Central Nepal N. of Pokhara, 28° 20′ N., 84° 03′ E., 2440m, 18 iv 1954, *Stainton, Sykes & Williams* 4880 (BM–holotype, KATH).

Similar to *C. chaerophylla* but more robust and low-growing. Rhizome stout, vertical, densely clothed at apex by small fibrous leaf-remnants. Basal leaves in a distinct rosette, smaller and with much shorter petioles than those of *C. chaerophylla*. Stems 25–50cm, one or few from each rosette, not or only slightly branched with 1–3 leaves. Racemes 20–40-flowered, dense. Sepals usually larger than in *C. chaerophylla*. Corolla 18–24mm, dirty yellow with brownish veins. Lower petal with a distinct basal gibbosity. Seeds 1·5–1·9mm.

HABITAT. On terrace banks and by tracksides; 1700–2700m.

DISTRIBUTION. South side of Dhaulaghiri, Annapurna and Himal Chuli. Endemic. 'Locally common by roadsides, in walls, and on banks of cultivated terraces S. of Annapurna'.

18 April–22 August.

Dobremez 77 (BM); *SSW* 2819 (BM, KATH), 3944 (BM, KATH), 4880 (BM, KATH), 5434 (BM, KATH).

24. **C. stipulata** Lidén, **sp. nov.** — Map 13; Fig. 15E; 16B–C

Tota planta crispato-puberula. Folia caulina superiora et intermedia foliolis basalibus stipuloidibus. Racemi 12–25-flori. Bracteae obovatae vel late lanceolatae pedicellis, fructiferis reflexis, longiores. Flores lutei infuscati, 15mm longi, alte cristati. Calcar laminam aequans. Semina nitida, 1·3mm longa. Aliter ut in *C. chaerophylla*.

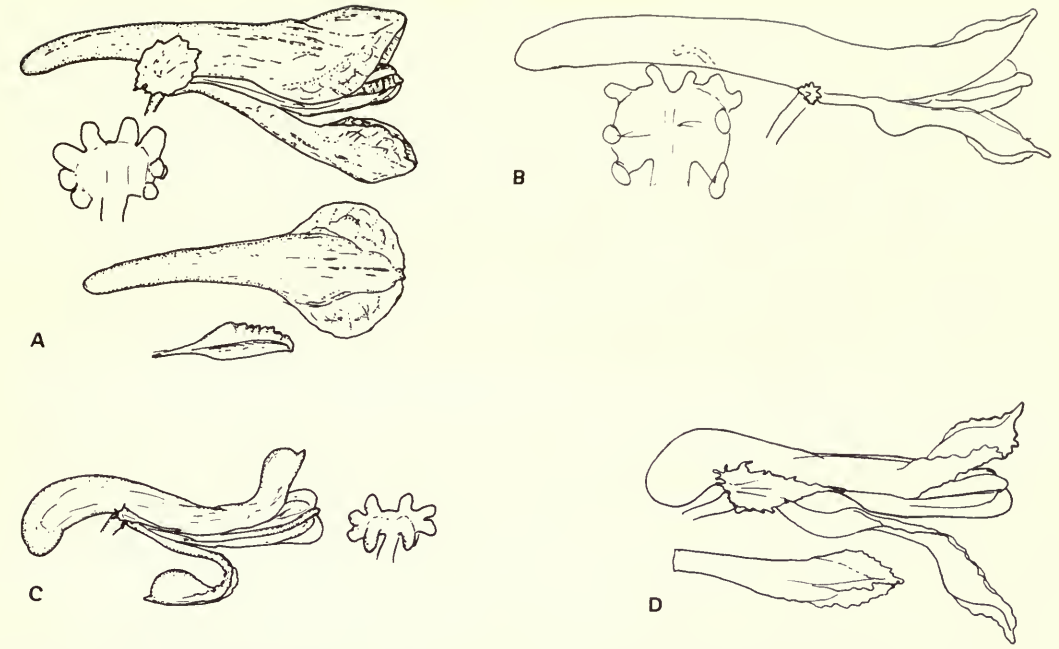


Fig. 25 A: *Corydalis flaccida* (cult. in GBG, origin: Sikkim). B: *C. leptocarpa* (*Dobremez* 3194). C: *C. flabellata* (cult. in GBG, origin Kashmir). D: *C. stricta* (*Stainton* 5532). Flowers and stigmas. In A also dorsal view of upper petal and inner petal. In D also lower petal. For scales see Fig. 2.

Type: Central Nepal, Mailung Khola S. of Ganesh Himal (28° 12′ N., 85° 12′ E.), 3350m, *Abies-Rhododendron* forest, 1·2m high, flowers yellow, 18 ix 1965, *Stainton* 5127 (BM—holotype, E, KATH). *C. chaerophylla* var. *geraniifolia* sensu Whitmore in Hara & Williams, 1979: 33 p.p., non (Hook. f. & Thomson) Hara.

Similar to *C. chaerophylla*, but crispate-puberulent throughout. Lowest pair of leaflets on upper cauline leaves, small, stipule-like (in this character similar to the related species *C. borii* from east Himalaya). Leaves bi-pinnate with coarsely and deeply dentate lobes with lamina decurrent on rachis. Racemes 12–25-flowered, rather long, laxer than in *C. chaerophylla*, simple or branched below, densely crispate-puberulent. Bracts obovate to broadly lanceolate, longer than the 5mm long pedicels which are deflexed in fruit. Corolla 15mm long, broadly cristate, yellow, suffused with brown. Inner petals with darker tips. Spur equalling limb, bent downwards. Seeds 1·3mm, with large elaiosomes.

Habitat. Along streams in forests; 2800–3500m.

Distribution. Endemic to Langtang area, central Nepal.

1 August–1 October.

Dhwoj 214 (E); *Nicolson* 2498 (BM); Langtang, *Poelt* s.n. (GZU); *Polunin* 1629 (BM); *Stainton* 5127 (BM, E, KATH).

The following species is provisionally included in this section:

25. **C. flaccida** Hook. f. & Thomson Map 22; Fig. 24A; 25A

Hooker & Thomson, 1855: 260. Type: Sikkim, 3350–3650m, *Hooker & Thomson* (K, not seen).

Robust herb, 50–130cm, from a stout long rhizome. Stems erect, stiff, leafy throughout, but branched only above, glabrous. Basal leaves 20–45cm, with petiole usually shorter than lamina, tripinnate with opposite pinnae; leaflets incised, ultimate lobes rounded, mucronate. Leaves thin, green above, glaucous beneath. Cauline leaves like the basal, becoming smaller,

less divided and sessile upwards. Racemes 8–20-flowered, dense. Lower bracts usually similar to the upper leaves but smaller; upper bracts linear to lanceolate, often with a distinct stalk, entire to dentate, ± equalling the short (5–10, or the lower ones to 30 mm long) slender pedicels. Flowers red, purple, mauve or bluish purple, 15–18 mm, with short attenuate spur *c.* 6 mm. Outer petals not cristate, with narrow base and broad blunt apex. Sepals rather large, 1·5–2 mm, orbicular, finely circum-dentate. Fruit linear, 25–30 mm, 8–15-seeded, dorsiventrally flattened. Style attenuate, *c.* 5 mm long. Seeds 1·9–2·0 mm, shiny, with small elaiosomes. Self-fertile.

HABITAT. Forests, clearings; 3000–4000 m.

DISTRIBUTION. Central and east Nepal, eastward to SW. China.

12 June–26 July.

Bailey 17/7 37 'Balugang' (E); *Beer* 8360 (BM), 9468 (BM); *Dhwoj* 143 (BM, E), 485 (E, KATH); *Gardner* 963 (BM); *Kanai & Shakya* 672558 (TI); *McCosh* 295 (BM, KATH); *PSW* 2411 (BM, E, KATH); *Sharma* 34/94 (BM), E379 (BM, E); *Shrestha* 15700 (KATH), 15711 (KATH); *Shrestha & Joshi* 344 (KATH), 410 (KATH); *Williams* 845 (BM).

Sect. **MUCRONIFERAE** Fedde ex Lidén, **sect. nov.**

Herbae perennes (vel raro annuae?) parvae caespitosae. Rhizoma elongatum. Caules foliati ± ramosi. Folia petiolis vaginantibus saepe ciliatis foliolis saepe mucronatis. Bracteae foliacei, plus minusvue divisae (in *C. clavibracteata* clavatae-subintegrae), lobiis saepe longe mucronatis. Pedicelli elongati apice uncati. Flores flavi petalo superiore longe calcarato. Capsula pauciseminata stylo longo instructa.
Fedde, 1936: 134; Wu & Shu, 1980: 202. Type species: *C. mucronifera* Maxim.

Dwarf cushion-forming scree-plants, often with long slender rhizomes. Stems leafy, branched. Petioles sheathing at base, often ciliate along the margins. Racemes short and dense, corymbose, usually not elevated above the leaves. Bracts leaf-like, ternately or flabellately divided, often ciliate along the margins and/or with aristate segments. Pedicels elongating, often apically hooked in fruit. Flowers sometimes with a ciliate claw to the lower petal. Capsule few-seeded with a long style. Seeds with very short 'aril base' (Brückner, 1985).

26. **C. megacalyx** Ludlow — Map 14; Fig. 17A; 18B

in Ludlow & Stearn, 1975: 58. Type: East of Chalike Pahar (28° 40′ N., 83° 04′ E.), 4600 m, 31 July 1954, *Stainton, Sykes & Williams* 3697 (BM—holotype, KATH).
C. nana Whitmore in Hara & Williams, 1979, p.p., non Royle.

Small cushion-forming perennial 3–6(–10) cm, very glaucous with one to several, often branched stems from a long slender rootstock. Leaves greyish, bi- to tri-ternate or the lowermost sub-pinnate with small deeply divided leaflets. Ultimate lobes small, obovate-lanceolate to narrowly linear, slightly mucronate. Petioles usually longer than lamina, sheathing at base, often papillose or ciliate on the margins. Racemes dense, corymbose, 4–10-flowered. Bracts like the leaves, smaller. Pedicels 10–20 mm, shorter than the bracts, erect in fruit with downcurved apex. Sepals large, 3–5 × 2–3 mm, deeply dentate, persistent after the corolla has fallen. Corolla 14–17 mm, yellow to cream, rarely white, with the inner petals blotched with blackish purple, and with two dark spots on the upper petal close to the apex, sweetly scented. Upper petal broadly auriculate, usually acute, broadly to narrowly cristate. Spur about as long as limb, tapering. Lower petal broadly rhombic, acute to subobtuse. Fruit pendent, 4–5 × 1·5–2·5 mm, obovoid, 3–10-seeded, explosively dehiscent. Style *c.* 3 mm. Seeds 0·8–1·4 mm, shiny.

HABITAT. Screes at high altitudes; 3800–5500 m. Commonly found together with *C. latiflora* but preferring finer substrate. Rarely in cliff crevices.

DISTRIBUTION. Almost throughout Nepal. 'Common N. of Dhaulaghiri, N. of Annapurna, and around Poykotang'.

12 July–4 October.

Beer 25400 (BM). 9564 (BM); *deHaas* 2499 (BM), 2567 (BM); *Einarsson* et al. 2707 p.p (BM); *Lowndes* 1256 (BM, E); *Maire* (BM); *McBeath* 1568 (E); *Manandar* 10138 (KATH); *Miehe* 369 (BM), 639 (BM), 13305 (BM), 13338 (GZU); *PSW* 3564 (BM, E), 4714 (E, KATH); *K. R. Rajbandari* 8317 (KATH), 8679 (KATH); *Shakya, Adhikari & Amatarya* 5254 (KATH); *Shrestha* 5360 (KATH); *Shrestha & Bista* 2553 (KATH); *Stainton* 7465 (BM); *SSW* 1796 (BM, E), 2050 (BM, E), 3697 (BM, E, KATH), 3767 (BM, E, KATH, TI), 4520 (BM), 4695 (BM), 4714 (BM), 7777 (BM, E).

Variable with respect to width of leaflets and colour of flowers. East of Annapurna the leaflets are usually short and narrow. Around Poykotang (central Nepal) specimens with cream flowers are common.

27. **C. clavibracteata** Ludlow — Map 15; Fig. 17B; 18C

in Ludlow & Stearn, 1975: 53. Type: Ringmigaon, 29° 04′ N., 82° 56′ E., 4700m, 21 September 1952, *Polunin, Sykes & Williams* 3540 (BM—holotype, E).

Very similar to *C. megacalyx* with which it occurs, but differing in a number of characteristics. Lower leaves larger, oblong, thrice pinnately cut into small, linear to lanceolate segments. Racemes dense, 10–15(–20)-flowered. Bracts different from the leaves, 12–20mm, clavate-obtuse, entire or with one or two small lobes or teeth, about as long as the pedicels. Flowers as in *C. megacalyx*, but sepals smaller, 1·5–2mm long. Fruits reflexed on erect pedicels, 3–6-seeded, oblong, *c.* 5mm long. Style 3–3·5mm. Seeds 1·2mm, shiny.

HABITAT. Screes, streamside gravel, slopes; 3700–4700m.

DISTRIBUTION. Endemic to west Nepal.

11 July–21 September.

Einarsson et al. 2707 (BM, mixed with *C. megacalyx*); *PSW* 2595 (BM, E, KATH), 3540 (BM, E); *Stainton* 5509 (BM, E), 5511 (BM, E).

28. **C. hendersonii** Hemsley — Map 23, Fig. 17C; 18A

Hemsley, 1894: 108. Type: Yarkand beyond Karakorum, Liagzi Thang and Lak Zung, 5500m, 1870, *Henderson* (K).

C. nepalensis Kitam., 1955: 2. Type: Thaple Himal, 4300m, 20 June 1953, *Nakao* s.n. (KYO—holotype).

Very densely tufted, small, fleshy and brittle. Stems 3–5cm, arising from the apex of a long rootstock which is apically crowned by the persistent leaves from previous years, often in distinct stages. Leaves fleshy, very glaucous, triternate with small triangular lamina and broad sheathing petioles which are usually ciliate along the margins. Ultimate leaflets narrowly linear to lanceolate, very small. Racemes very dense, 3–8-flowered, corymbose. Pedicels 12–18mm, erect and apically reflexed in fruit. Bracts much divided. Sepals narrowly linear. Flowers vertically held with only the apices protruding above the dense mass of leaves and bracts, 20–22mm long, yellow, rather broadly winged with rhombic-acute limb, cristate. Spur 10–11mm long, slender. Fruit hidden among the bracts, 5–11mm, oblong, 1–9-seeded. Style very long, 5–6mm. Seeds 1·8mm, shiny.

HABITAT. 'silty scree'; 4000–6100m.

DISTRIBUTION. Widely distributed on the Tibetan plateau. See also Wu & Shu, 1980.

26 June–30 June.

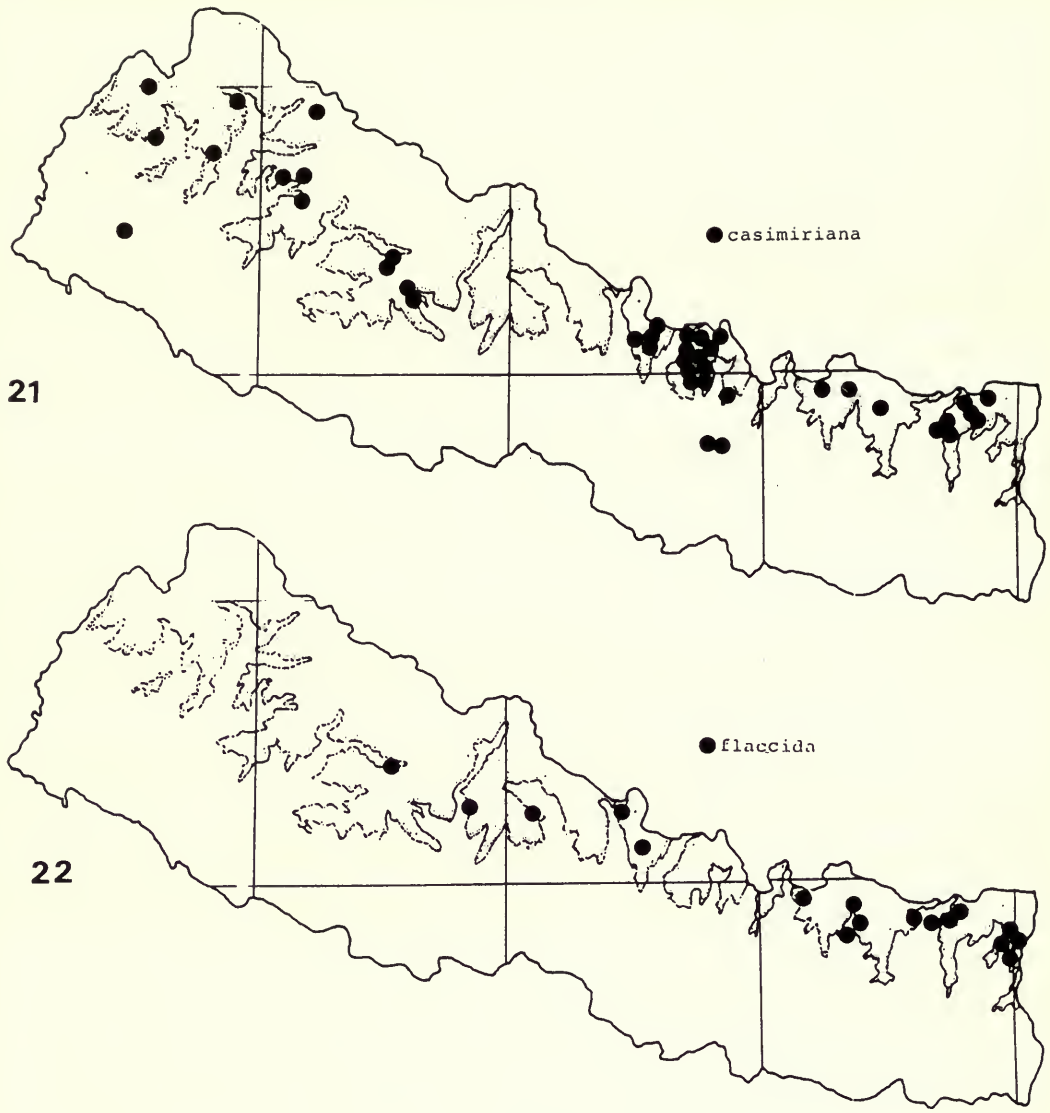
McCallum D30 (KI); *Nakao* s.n. (KI); *PSW* 34 (BM, E, KATH), 1418 (BM), 1425 (BM).

Sect. **RAMOSO-SIBIRICAE** Fedde ex Wendelbo

Wendelbo, 1974: 4. Type species: *C. vaginans* Royle.

Annual, biennial, or perennial herbs with branched leafy stems. Flowering stems terminal as well as axillary. Flowers usually yellow.

The section is not clearly demarcated from *Capnogorium*.

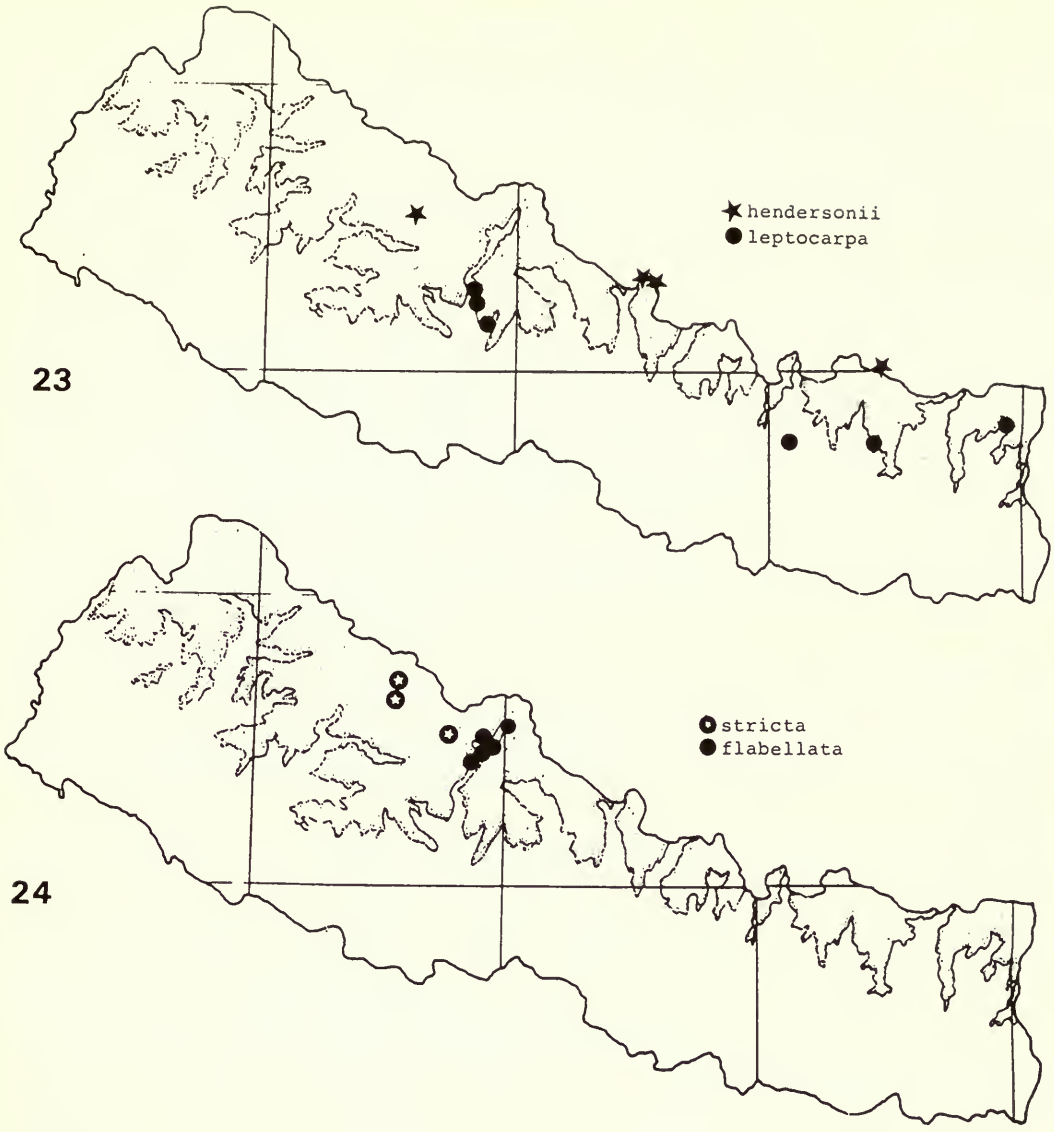


29. **C. hookeri** Prain Map 17; Fig. 19C–D; 20A

Prain, 1896: 34. Type: Nepalese Tibet, *Hooker* (K—holotype).

C. denticulatobracteata Fedde, 1928: 219; Type: Sikkim, Lungma Chu, 4880m, August 1909, *Smith & Cave* 2244 (E—holotype). Differs by larger flowers.

Usually perennial herb. Stems 10–50cm, leafy, much-branched, arising from a slender rootstock. Leaves very glaucous, somewhat fleshy, ± scabrid on the veins beneath, pinnate with pinnatisect to ternatisect leaflets. Ultimate lobes often imbricate, obovate to lanceolate, usually shortly mucronate. Lamina oblong, about as long as or often longer than the petiole; lowermost pair of leaflets often smaller. Racemes dense, branched, 10–30-flowered. Bracts about as long as pedicels, 5–8mm, narrowly linear or lower bracts often divided. Flowers yellow, tinged brown, 14–16mm with spur about half as long, acute to shortly acuminate with



rather broad crests which reach the tips. Inner petals usually pale, rarely tipped with brownish purple. Fruit 8–10 mm, 2–4-seeded, oblong. Style 3–4 mm. Seeds 1·8 mm, shiny. Self-fertile.

HABITAT. Hillsides, edges of fields, 'scree', 'Caragana-steppe'; 3000–5000 m.

DISTRIBUTION. South Tibetan area. 'A common weed in Muktinath, and by roadsides between Thorung La and Manang'.

15 May–22 September.

Banerji & Shakya 5682 (KATH); *Einarsson* et al. 3002 (BM); *Grey-Wilson & Phillips* 460 (BM), 479 (BM); *Joshi & Battacharya* 74–2231 (KATH); *Lowndes* 1044 (BM), 1151 (BM), 1197 (BM, KATH); *Manandar* 10073 (KATH), 10096 (KATH); *McBeath* 1501 (E); *PSW* 1435 (BM); *K. R. Rajbandari* 8283 (KATH), 8378 (KATH); *Shakya, Adhikari & Amatya* 5139 (KATH); *Shrestha* 5270 (KATH), 5387 (BM, KATH); *Stainton* 4368 (BM), 5496 (BM, E), 5502 (BM, E), 5536 (BM, E), 7153 (BM); *SSW* 2021 (BM, KATH), 2113 (BM, KATH), 2217 (BM, KATH), 2334 (BM, KATH).

30. **C. spicata** Lidén, **sp. nov.** Map 17; Fig. 19E, 20B

Herba ad 0·5m alta, valde glauca. Caules foliati ramosi. Folia pinnata foliolis ternatis vel subpinnatis, segmentis ultimis latis, obtusis. Racemi multiflori, spicati. Bracteae parvae, lanceolatae vel ad basin racemi divisae. Pedicelli filiformes 5mm longi. Corolla ecristata, flava, 14mm longa, calcari 8–9mm longo attenuato incluso. Petalum inferius ad basin non saccatus. Nectarium 5mm longum. Ovarium biovulatum. Stylus infra stigma incrassatis.

Type: West Nepal, Jumla district, Kabra, 29° 20′ N., 82° 20′ E., 2580m, 'herb up to 0·5m, in caves', 24 viii 1985, *P. R. Shakya, M. N. Subedi & R. Uprety* 8802 (GB—holotype, KATH).

Glaucous herb up to *c.* 0·5m, basal parts unknown. Stems leafy, branched, slender. Leaves very glaucous on both sides. Petiole 5–10cm. Lamina oblong, pinnate, *c.* 15cm long. Primary leaflets ternate to sub-pinnate, stalked. Secondary leaflets sessile or shortly stalked, ± divided into broad obtuse segments. Racemes spicate, elongating, 15–40-flowered. Bracts small, lanceolate, or the lowermost larger and ± divided. Pedicels filiform, *c.* 5mm long, ± equalling the bracts. Sepals small, *c.* 0·5mm broad. Corolla slender, yellow, 14mm long including an 8–9mm long tapering spur. Upper petal with a very narrow rim, not truly cristate. Lower petal 6–7mm long, broadly obovate-acute, not saccate at base. Inner petals 6mm long, probably darker at apex. Nectary 5mm long, partly fused to the spur. Fruit and seeds unknown; ovary with 2 ovules. Stigma as in *C. vaginans* and *cornuta*. Style 2mm long, thickened below the stigma.

Only known from the type specimen. Similar to *C. hookeri* in leaves and bracts, but differing in the spicate racemes, the small ecristate subacute pure yellow corollas, and the thin pedicels.

31. **C. vaginans** Royle Map 17; Fig. 19G; 20C

Royle, 1833: 69; *C. ramosa* var. *vaginans* (Royle) Hook. f. & Thomson, 1855: 267 comb. illegit. (Art. 67.1). Type: Kanum in Kunawur, *Royle* (LIVU—lectotype, K).

C. ramosa Hook. f. & Thomson, 1855: 267 nom. superfl. (Art. 63.1); Whitmore in Hara & Williams, 1979: 35. Type: Kumaon, *Blinkworth*, Wallich Cat. 1434 (K-W-lectotype; specimen in BM is *C. stracheyi*).

Annual to biennial, densely branched from the base with branched leafy angular stems, erect to decumbent, 15–50cm. Leaves triangular-oblong, bi-tri-pinnate to sub-ternate with sheathing petioles, becoming smaller upwards. Ultimate lobes lanceolate. Racemes simple or branched at base, 8–15-flowered, elongate. Bracts to 10mm, the lower leaf-like, deeply divided, often papillose-scabrid on the veins beneath, the upper bracts linear, entire. Pedicels 4–10mm in fruit, reflexed. Corolla yellow, often with brownish veins, 14–17mm, including spur about half as long. Crests of outer petals dentate. Lower petal with a conspicuous basal pouch. Fruit 9–12mm, obovoid, 7–11-seeded, explosively dehiscent. Style 2·5mm. Seeds 1·2–1·4mm, shiny, smooth. Self-fertile.

HABITAT. 'Open stony slope'; 3200m.

DISTRIBUTION. Kashmir to west Nepal.

17 August.

PSW 5274 (BM).

32. **C. cornuta** Royle Map 18; Fig. 19F; 20D

Royle, 1833: 68. Type: Choor mountains, *Royle* (K, LIVU—lectotype).

C. ramosa sensu Whitmore in Hara & Williams, 1979: 35 p.p., non Wallich ex Hook. f. & Thomson.

Similar to *C. vaginans* in habit but leaves bi- to tripinnate with opposite pinnae, glaucous beneath. Ultimate lobes broadly obtuse, mucronate. Racemes 10–15-flowered. Pedicels 2–5mm. Bracts 4–8mm, usually divided, or the uppermost entire. Flowers 14–16mm, more slender than those of *C. vaginans* with entire crests and comparatively longer spur. Lower petal with a conspicuous basal pouch. Inner petals tipped with blackish purple, or very rarely concolorous. Fruit 8–9 × 2–3mm, more narrowly obovoid, 8–16-seeded. Seeds dull, punctulate, 1·0mm.

HABITAT. Hillsides, often in man-made habitats; 2300–4000m.

DISTRIBUTION. Kashmir to Sikkim.

24 April–18 September.

Bailey s.n., 'Insung La 31/5 1935' (BM); *Battari, Sharma & Dahal* 80123 (KATH); *Dhwoj* 182A, 'Soongorey 1929' (BM, E p.p), 063, 'Dorpu, 1930' (BM, E); *deHaas* 2307 (BM); *Manandhar* 9751 (KATH); *Miehe* 2838 (BM), 10332 (BM), 11158 (BM); Langtang, *Poelt* s.n. (GZU); *Polunin* 134 (BM), 766 (BM), 1560 (BM); *PSW* 111 (KATH), 2438 (KATH), 2507 (BM, KATH); *Sharma* E233 (BM); *Shrestha* 4221 (KATH); *Stainton* 4937 (BM); 5128 (BM); *Tyson* 100 (BM).

33. **C. filicina** Prain Map 19; Fig. 19H; 21C

Prain, 1896: 30. Type: Sikkim, Ney-go-La on the Singale-La range, September 1887, *King's collector* (CAL—holotype, BM—photograph).

Stems slender, simple or branched with 2–5 cauline leaves, 15–30(–40)cm, arising from a deeply buried elongate smooth rootstock, with a diffuse few-leaved rosette. Leaves triangular, bi-pinnate (in *SSW* 6542), to usually bi- or triternate with long petioles. Leaflets cut into small linear-lanceolate (in *SSW* 3732) or usually broadly obovate lobes. Racemes lax, 3–10(–15)-flowered. Pedicels 10–20mm, much longer than the bracts which are either divided into linear segments, or oblanceolate and dentate, or entire. Flowers yellow with darker veins, rarely white, 16–20mm long. Spur about as long as remainder of corolla. Crest of upper petal decurrent on spur. Outer petals broadly auriculate, acute at apex. Fruit (immature) linear, *c.* 10-seeded. Style 3·5mm. Seeds unknown.

HABITAT. Wet organic soil, pastures, grass-turf, also in burnt patches, often together with *C. casimiriana* or *C. calycina*; 3000–4500m.

DISTRIBUTION. Sikkim, Bhutan, central Nepal. 'North of Dhaulaghiri (above Marpha), common between Pangsing Banyang and Poykotang'.

30 April–1 September.

deHaas 2332 (BM); *Miehe* 10799 (GZU); *Sharma* E294 (BM); *SSW* 3732 (BM), 6542 (BM). Cultivated in GBG.

34. **C. cavei** D. Long Map 19; Fig. 19I; 21A–B

D. Long, 1984: 104. Type: Sikkim, Phallut, 27° 12′ N., 88° 01′ E., 3350m, 1 September 1919, *Cave* s.n. (E—holotype).

C. longipes sensu Whitmore in Hara & Williams, 1979: 34 p.p., non DC.

Perennial with slender weak stems, much branched from the base. Rootstock narrow. leaves bi-pinnate to bi-ternate with deeply divided segments, glaucous beneath. Ultimate lobes broadly obovate, obtuse. Petioles of lower leaves longer than lamina, upper shorter. Racemes 5–25-flowered, rarely with a basal branch, elongate, rather dense at anthesis. Bracts leaf-like below, dentate to entire above, usually shorter than the slender 5–15mm long pedicels which are downwardly arcuate in fruit. Flowers 16–19mm, yellow to orange with the tips of the inner petals dark. Upper petal with a broad crest reaching the apex and there abruptly terminating, narrowly decurrent on the short (7–9mm) spur. Lower petal broadly winged, acute-acuminate, shortly cristate. Fruit 10–13mm, linear, 5–7-seeded. Style 2·5mm. Seeds unknown.

HABITAT. 'Sandy scree', 'grassy meadow'; 2700–4300m.

DISTRIBUTION. Endemic to east Nepal and west Sikkim.

12 June–5 October.

Beer 8394 (BM), 25393 (BM); *Dhwoj* 093 (BM, E); *Dobremez* 1719 (BM); *Horsfall* 10 (BM); *Sharma* E492 (BM, E); *Stainton* 647 (BM), 1124 (BM, TI), 4751 (BM, TI); *Wraber* 407 (BM); *Zimmerman* ('Bernhardi' in Whitmore in Hara & Williams, 1979) 1372 (BM).

Corydalis cavei is related to the east Himalayan *C. crispa*, which is more richly branched and

has smaller flowers with more slender spurs and 3–4-seeded fruit. *C. cavei* is similar to *C. filicina* in habit.

35–40. **C. sibirica** group Map 15, 20, 21; Fig. 24–25

Annual to perennial small-flowered slender plants, reminiscent of *Fumaria* in habit. They are found from Siberia through west China and east Tibet and throughout the Himalayas. Their most distinctive attribute is the peculiar stigma. The Himalayan representatives of the group have (except for the rather different *C. lathyroides*) been lumped together in a collective '*C. longipes*' s.lat., but there are several vicariant species.

35. **C. longipes** DC. Map 20; Fig. 22A; 23A

DeCandolle, 1824: 128. Type: Nepal, *Wallich* 1433*a* (G—holotype, BM, K, K-W).

Ascending to subscandent annual or short-lived perennial with leafy slender branched trailing stems. Leaves twice ternate, segments deeply lobed, lobes 1–4mm broad, narrowly obovate, obtuse. Upper leaves smaller and less divided. Lower petioles long, upper short. Racemes long and slender, lax, 5–14(–19)-flowered, soon longer than the short peduncle, elongating in fruit. Bracts 1/5–1/2 as long as the slender pedicels, dentate to lobed, the lower often leaf-like, the upper sometimes entire. Pedicels 10–20mm, slender, somewhat elongating in fruit. Sepals 1(–1·5) × 1–1·5mm, whitish, deeply circumdentate, broadly reniform, shed together with the corolla. Corolla pale to bright yellow (in *Polunin* 1627 white with lemon-yellow tips and purple tinged at apex of the very long-aristate outer petals), 9–12mm long from apex of spur to the apices of the inner petals, broadly cristate, jasmine fragrant. Outer petals long acuminate, often with the crest reaching the apex. Inner petals equalling spur, never dark at apex. Lower petal usually shortly cristate, 7–9mm long, with a basal pouch and a constriction in the middle. Nectary very short but conspicuous, up to 1/5 the length of the spur. Fruit 5–10 × 2–3mm, obovoid, 8–15-seeded, abruptly narrowed into a 2–3mm long style. Seeds shiny, biseriate, 1·0–1·2mm. Stigma with 6 stalked apical papillae. Self-sterile.

Habitat. Along shady paths in forests, wet stony places, field-margins, roadsides; 2000–3500(4300?)m.

Distribution. Endemic to central Nepal, not in drier areas. 'Common S. and SW. of Annapurna, and N. and NW. of Trisuli Bazar'.

3 June–1 October.

Bista 3209 (KATH), 3210 (KATH); *Dhwoj* 144 (BM, E), 182 (BM, E p.p); *Grey-Wilson & Phillips* 325 (BM, K); *deHaas* 2076 (BM); *Lowndes* 1461 (BM, E, KATH); *Maire* 338 (BM); *Malla* 4866 (KATH); *Manandhar* 10329 (KATH); *Miehe* 850 (BM); Langtang, *Poelt* s.n. (GZU); *Polunin* 1627 (BM, E); *Pradhan & Shrestha* 37 (KATH); *S. B. Shah* 187 (KATH); *Stainton* 4588 (BM), 5096 (BM), 8425 (E); *SSW* 1642 (BM, KATH), 4369 (BM, KATH), 4504 (BM, KATH), 6263 (BM, KATH), 7459 (BM, KATH); *Troth* 978 (BM, KATH); *Uphadiya & Rajbandari* 2224 (KATH); *Wallich* 1433 (BM, G, K); *Williams & Stainton* (BM).

Plants with rows of papillae on the fruit, usually correlated with papillose or fringed crests to the outer petals, occur scattered throughout the distribution area.

36. **C. filiformis** Royle Map 20; Fig. 22B; 23B

Royle, 1833: 68. Type: Surkunda to Mussorie, 17 June, *Royle* (LIVU—holotype).
C. longipes in Prain, 1896 and Jafri, 1974, non DC.

Very similar to *C. longipes*. Racemes 3–11-flowered. Lower bracts leaf-like, upper often clavate-entire, shorter than the slender 10–20mm long fruiting pedicels. Sepals large, 2–3 × 1·5–2mm, deeply fimbriate. Corolla pale yellow, 10–12mm. Outer petals cristate, acuminate. Lower petal not constricted in the middle, 9(–10)mm, with a prominent basal pouch, almost like a short broad spur, with a short low crest. Inner petals pale, or tipped with blackish purple, but with pale dorsal wings. Nectary about half as long as the spur, partly fused to it.

Fig. 26 A: *Corydalis leptocarpa* (*Stainton* 4536). B: *C. stricta* (*PSW* 1136). C. *C. flabellata* (*Grey-Wilson & Phillips* 374). × ¼.

Fruit 8–10mm, 8–18-seeded, biseriate. Style 3mm long. Seeds 1·1–1·3mm. Stigma with 6 apical papillae, of which the 4 central are conspicuously longer.

HABITAT. 'shady place', 'exposed slopes in oak-Rhodo-forest', 'alpine meadow'; 2500–4000m.

DISTRIBUTION. From south-central Nepal (S. of the main Himalayan range) to Kashmir.

28 July–17 August.

Bista & Joshi 174 (KATH), 513 (KATH); *Kanai* 673312 (KATH, TI); *Shakya, Subedi & Uprety* 8425 (KATH, GB).

The Kashmir specimens have conspicuously larger, often reddish-tinted sepals, and smaller yellow corollas with dark apices. In this and the following species some, probably perennating, specimens have thickened adventitious roots.

37. **C. calycina** Lidén, **sp. nov.** Map 20; Fig. 22C; 23C

Corydali longipede similis. Caules ramosi, debiles. Sepala magna, 2–3 × 1·5–2mm, dentata vel lacerata. Petalum superius cristatum, late alatum, truncatum, apiculatum. Petalum inferius non gibbosum. Nectarium 2–4mm longum, calcari connatum. Capsula obovata, 5–9 × 2mm. Semina nitida, 1·2mm longa, biseriata. Stigma cum quattuor papillis stipitatis.

Type: W. Nepal, Maharigaon (29° 22′ N., 82° 24′ E.), 3200m, 14 vii 1952, *Polunin, Sykes & Williams* 158 (BM—holotype).

Similar to *C. longipes* and *filiformis* but usually smaller. Racemes 5–14-flowered. Upper bracts small, entire. Sepals 2–3 × 1·5–2mm, dentate to lacerate, often early caducous. Corolla 9–11mm. Spur of upper petal slightly longer than to sub-equalling the inner petals. Wings and crests of upper petal broad, abruptly terminating, leaving the short filiform apex free. Lower petal not crested, *c.* 6mm long, devoid of basal pouch and not constricted in the middle, broad at apex. Nectary fused to the spur, 2–4mm long. Fruit 5–9 × 2mm, narrowly obovoid, 8–10(–14)-seeded, similar to that of *C. longipes*. Style 2–2·5mm. Seeds 1·2mm, shiny, biseriate. Stigma with 4 stalked apical papillae.

HABITAT. Moist open grassy slopes, pastures; 3100–4600m.

DISTRIBUTION. Nepal westwards from Annapurna, endemic. 'Locally common N. of Dhaulaghiri (above Marpha). Also recorded between Thorung La and Manang N. of Annapurna'.

1 July–27 September.

Arnold 135 (BM); *Grey-Wilson & Phillips* 786 (K); *PSW* 158 (BM), 4593 (BM), 5438 (BM); *Shakya, Subedi & Uprety* 8625 (KATH, GB); *SSW* 3329 (BM). Cultivated in GBG.

38. **C. pseudolongipes** Lidén, **sp. nov.** Map 20; Fig. 22D; 23D

Corydali longipede et *casimirianae* similis. Caules plures valde ramosi, debiles. Bracteae magis divisae (raro integrae). Sepala parva, ad 1mm longa, profunde lobata (raro minuta, integra). Petala interiora apice atropurpurea. Petalum inferius ad basin gibbosum. Nectarium crassum, 1mm longum, calcari non connatum. Capsula obovata, 5 × 2mm. Semina nitida, 1·2mm, biseriata. Stigma cum quattuor papillis stipitatis.

Type: East Nepal, Bhararate Himal S. Makalu, Barun Khola below the Yangla pasture, 3500m, 4 x 1972, *T. Wraber* 385 (BM—holotype).

C. longipes var. *burkilli* Fedde, 1920: 314. Type: Sikkim, Singale-La, 3660m, September 1906, *J. H. Burkill* 27664 (K).

C. longipes var. *phallutiana* Fedde, 1920: 314. Type: Sikkim, October, 1908, *Ribu* 355 (K).

C. longipes var. *smithii* Fedde, 1920: 315 (p.p., incl. type). Type: Sikkim, Shorabthang 3960m, August 1910, *W. W. Smith* 4303 (E).

C. longipes sensu D. Long, 1984, non DC.

Similar to *C. longipes* and *casimiriana*. Racemes 3–10-flowered. Bracts usually divided throughout the inflorescence, more than half as long as the 5–10(–15) mm long slender pedicels, rarely the upper bracts entire. Sepals small, *c.* 1 mm, often deeply divided, rarely minute, entire. Corolla 9–12 mm long. Upper petal acute or very shortly acuminate. Spur of upper petal 5–6 mm long, curved upwards, slender, longer than the short inner petals which are externally tipped with black-purple. Lower petal *c.* 5–6 mm with a basal pouch and a constriction in the middle. Nectary short, prominent, up to 1 mm long, not fused to the spur. Fruit 5(–7) × 2 mm, obovoid, often minutely papillose all over the surface, up to 10-seeded. Seeds 1·2 mm, shiny, biseriate. Stigma with 4 stalked apical papillae.

HABITAT. 'slopes'; 2800–3960 m.

DISTRIBUTION. East Nepal, Sikkim, Bhutan.

18 July–4 October.

Banerji, Shrestha & Upadhya 2773 (deviating in small entire bracts, KATH); *Beer* 9527 (BM, K); *Shrestha & Joshi* 124 (BM, KATH); *Saiju, Goshi, Pradhan & Subedi* 28 (KATH); *Wraber* 335 (BM), 386 (BM).

39. **C. casimiriana** Prain

Map 21; Fig. 22E–F; 23E–F

Prain, 1896: 27; *C. prainiana* Kanodia & Mukerjee in Mukerjee, 1973, nom. superfl. (Art. 63.1). Type: Kumaon, *Duthie* 5312 (CAL?, BM, same number from two other localities).
C. longipes sensu Whitmore in Hara & Williams, 1979: 34 p.p., non DC.

Similar to *C. pseudolongipes*. Racemes 4–11-flowered with rather long peduncles. Middle and upper bracts often entire, shorter than the 5–10(–13) mm long slender pedicels. Sepals 0·5–1 mm, dentate, reniform. Corolla 8–10(–11) mm long, slender, more narrowly winged than in *C. pseudolongipes*. Outer petals acute at apex or very shortly acuminate. Spur equalling or often longer than the inner petals, narrow, often curved upwards. Lower petal not cristate, 5–6 mm, without a basal pouch and a constriction in the middle. Nectary fused to the spur, 2–3 mm long. Inner petals usually tipped with blackish purple. Fruit 6–15 × 1(–2) mm, linear, 6–13-seeded. Style 1·5–2 mm. Seeds shiny, 0·9–1·1 mm, usually uniseriate. Stigma with 4 stalked apical papillae. Self-fertile.

HABITAT. 'screes', open grassy slopes, pastures, frequent in burnt areas; 2800–4700 m.

DISTRIBUTION. Almost throughout the Himalayas, but absent from the Annapurna area. 'Common N. of Trisuli from Sing La to Poykotang'.

Arnold 77 (BM); *Banerji* 1249 (KATH); *Banerji & Shakya* 5601 (KATH); *Beer* 9425 (BM), 9464 (BM), 25480 (BM); *Dep. Med. Plants* 147 (KATH); *Dhwoj* 22 (BM, K), 280 (BM, E); *Duthie* 5312 (BM); *Einarsson* et al. 2240 (KATH), 2241 (BM), 2473 (BM, KATH); *deHaas* 2105 (BM), 2254 (BM), 2701*a* (BM); *Horsfall* 10 p.p. (BM); September 1978, *Idzumi & Togashi* (TI), September 1979, *Idzumi & Togashi* (TI); *Itok & Rajbandari* 1180 (KATH); August 1969, *Kanai & Malla* (TI); *Malla* 16123 (KATH); *Malla & Rajbandari* (KATH); *Manandar* 165 (KATH); *Manandar & Joshi* 6709 (KATH); *Miehe* 4111 (BM), 7497 (BM), 7540 (BM), 7611 (BM), 8117 (GOET), 8557 (BM), 9436 (Xining), 10634 (BM), 10814 (GOET), 11119 (BM), 11147 (GOET), 11427 (Xining), 11875 (GOET), 12308 (BM); *Nicolson* 2651 (BM, KATH); Langtang, *Poelt* s.n.(GZU); *Polunin* 1068 (BM), 1214 (BM), 1769 (BM), 1785 (BM); *PSW* 111 (BM), 402 (BM, KATH), 2438 (BM), 4165 (BM); *K. R. Rajbandari* 9733 (KATH); *Shaka, Adhikari & Subedi* 8247 (KATH); *Shakya, Subedi & Uprety* 8454 (KATH), 8744 (KATH), 8812 (KATH); *Shrestha & Shakya* 3761 (KATH); *Shrestha & Joshi* 482 (BM, KATH); *Smith* 176 (BM); *Stainton* 1700 (BM, KATH), 5115 (BM); *SSW* 3526 (BM), 3871 (BM, KATH), 4397 (BM, E, K); *Yon* 170 (BM). Cultivated in GBG.

There seems to be two vicariant forms which perhaps could be recognized as subspecies. From Annapurna eastwards all specimens have short, 6–10 mm long, linear to very narrowly obovoid fruits which are uni- to incompletely biseriate. This seems to be the same as *C. gracilis* Franchet, non Ledebour, from SW. China. Westwards from Annapurna the fruits are 12–15 mm long, linear and uniseriate, with one exception, *SSW* 4397 (83° 13′ E.), which has short fruits.

40. **C. lathyroides** Prain Map 15; Fig. 21D; 22G

Prain, 1896: 23. Type: Kumaon, Ralam valley, 3050–3350m, on rocks, *Duthie* 7208 (K).
C. brevicalcarata Ludlow, 1975: 287 – Whitmore in Hara & Williams, 1979: 33. Type: West Nepal, Bhurchula Lekh, S. of Jumla, 14 July 1952, *Polunin, Sykes & Williams* 4684 (BM-holotype, E).

Delicate plant, branched from the base with sparingly leafy stems 10–20cm. Leaves narrowly oblong, once pinnate, lower with long petioles, upper sessile. Leaflets in 3–5(–6) pairs, entire or usually divided into 2–5 segments which are obovate-obtuse. Racemes terminal and axillary from the upper leaves, 4–10-flowered, lax. Bracts 3–4mm, entire, much shorter than the slender erecto-patent pedicels which attain 5–15mm in flower, 15–20mm in fruit. Sepals 0·75–1·5mm, shallowly dentate, Corolla 8–10mm long, not or very narrowly cristate. Upper petal acute with a short spur 3·5–5mm long, slightly curved upwards. Lower petal 7mm long, acute, without a basal pouch. Nectary very slender, 2/3 as long as the spur. Fruit 6–8 × 1·5–2mm, narrowly obovoid, to 15-seeded. Style 2mm long. Seeds small, 0·7mm, with very long elaiosomes, glossy, biseriate. Stigma with 4 stalked apical papillae.

HABITAT. Cliff ledges, shady rocks; 2500–3900m.

DISTRIBUTION. Kumaon, west Nepal (Sikkim, Bhutan).

1 July–6 August.

Malla 14138 (BM, KATH); *PSW* 2454 (BM, KATH), 4684 (BM, E); *K. R. Rajbandari* 8269 (KATH); *Shakya, Subedi & Uprety* 8531 (KATH, GB); *SSW* 1706 (BM, KATH), 6547 (BM).

The east Himalayan specimens have distinctly larger corollas.

Sect. **ASTEROSTIGMATA** (Fedde) Fedde

Fedde, 1936: 135. Type species: *C. temulifolia* Franchet.

Annual to perennial herbs, with ternately to pinnately divided leaves, frequently with bulbils in the axils. Flowers pink, usually with long narrow spurs, subtended by ± foliose bracts. Fruits linear.

41. **C. leptocarpa** Hook. f. & Thomson Map 23; Fig. 25B; 26A

Hooker & Thomson, 1855: 260. Type: Bhutan, *Griffith* 1152 (K—lectotype, E).

Annual or perennial. Stems 10–40cm, densely branched from the base with slender branched branches. Leaves triangular, biternate with broad, obtuse, ± divided leaflets, glaucous beneath. Racemes lax, (1–)2–4-flowered (5–9-flowered in east Himalaya). Bracts 6–12mm, ovate-lanceolate, stalked, the lower ones lobed, the upper entire. Pedicels 5–8mm, deflexed in fruit. Flowers 22–25mm with spur equalling limb, mauve, pink or purple, ± cristate, rather broadly winged but acute or mucronate at apex. Fruit 24–35mm, linear, 10–20-seeded. Style attenuate, 4mm. Seeds 1·2mm, glossy. Self-fertile.

HABITAT. Stony places, walls, roadsides, etc., scattered; 1900–3000m.

DISTRIBUTION. Central and east Nepal to SW. Yunnan. 'Ulleri, SW. of Annapurna'.

9 May–25 July.

Dobremez 3194 (BM, KATH); *McCosh* 71 (BM); *Shrestha* 15–454 (KATH); *Stainton* 4536 (BM, E); *SSW*5756 (BM); *Williams* 437 (BM, E).

The Nepalese specimens differ in their more slender flowers and few-flowered racemes. *C. leptocarpa*, together with *C. chaerophylla* and *C. terracina*, is one of only three species occurring below 2000m.

Sect. **STRICTAE** (Fedde) Wendelbo

Wendelbo, 1974: 8; Fedde, 1936: 133 as subsect. Type species: *C. stricta* DC.
Sect. *Chremnocapnos* Wendelbo, 1974: 10. Type species: *C. rupestris* Boiss.
Sect. *Flabellatae* Fedde ex Michalkova, 1981: 82. Type species: *C. flabellata* Edgew.

Caespitose perennials, often with dense remnants of dead leaf-bases. Bracts small, linear, often caudate. Stems leafy, rarely sparingly so. Flowers yellow, narrow, often acuminate, usually with short saccate spurs. Capsules usually linear and pendent on short deflexed pedicels. Stigma transversally elliptic with a small body and ten long papillae.

42. **C. stricta** DC. Map 24; Fig. 25D; 26B

DeCandolle, 1824: 123. Type: Altai mts, *Stephan* (G—holotype, S).
C. astragalina Hook. f. & Thomson, 1855: 270. Type: Panang valley, *Thomson* (K).
C. schlagintweitii Fedde, 1914: 303. Type: SW. Tibet, Pangkong, Tsomognalari, June 1856, *Schlagintweit* 7002 (LE).

Rootstock very thick but weakly lignified, papery, dark brown, sometimes split up, densely crowned with leaf-bases and scales. Stems 15–40cm, stout, fleshy, leafy. Leaves crowded at base, pinnate to bi-pinnate with ternately divided segments; ultimate lobes oblanceolate. Upper cauline leaves smaller, subsessile. Racemes very dense, oblong with thick rachis, 30–60-flowered. Bracts 5–7mm, scarious, linear-acuminate, as long as or longer than the pedicels which are 4–5mm. Sepals 4 × 1·5mm, dentate-fimbriate. Flowers yellow, 15–17mm long, narrowly winged, acuminate, with a short saccate spur. Fruit 15–18mm, broadly linear, pendent, 6–9-seeded with attenuate style 4–5mm.

HABITAT. Dry sandy slopes; 4000–5400m.

DISTRIBUTION. Dolpo in Nepal, Tibet, Altai.

15 June–15 July.

Dobromez 2931 (BM, KATH); *PSW* 1136 (BM, E, KATH); *Stainton* 4353 (BM, KATH), 5532 (BM, E).

The Nepalese and south Tibetan specimens have shorter bracts, denser racemes, and more finely cut leaves than those from Altai and north Tibet.

43. **C. flabellata** Edgew. Map 24; Fig. 25C; 26C

Edgeworth, 1851: 30. Type: Kumaon, *Edgeworth* (K).

Very glaucous fleshy plant. Stems erect, 15–30cm, leafy, simple or branched, arising from a thick rootstock crowned by the fragile remnants of older leaves. Leaves pinnate with 3–5 pairs of distant, broadly flabellate, entire or deeply dissected leaflets. Racemes long, spicate, lax, 10–30-flowered. Bracts small linear, caudate, slightly longer than the very short (2–3mm) pedicels which are bent downwards in fruit. Sepals large, 3–4mm, caudate, laciniate at base. Flowers 12mm long, narrow, curved, with a short saccate spur, yellow, shortly rostellate. Fruit 15–20mm long with a 3mm long style, linear, pendent, 5–8-seeded. Seeds shiny, 1·3mm with a short beak to the elaiosome. Self-fertile.

HABITAT. Dry gravel, cliffs; 3000–3500m.

DISTRIBUTION. Upper Kali Gandaki valley, west Himalaya, SW. Tibet.

18 May–17 August.

Dobremez 3030 (BM, KATH); *Grey-Wilson & Phillips* 374 (BM, K), 694 (K); *Joshi & Battacharya* 74–2068 (KATH); *Shakya, Adhikari & Amatya* 5097 (KATH); *SSW* 7301 (BM, KATH).

Acknowledgements

I am indebted to Dr Shakya and his colleagues at the Department of Medicinal plants, Godawari, Nepal, for their generous support during my visit there, and for putting material at my disposal. Dr G. Miehe sent me his valuable personal collections. The British Museum (Natural History) and Tokyo University generously lent their collections for study. Prof. Å. Frid and Dr R. Mill kindly checked the Latin descriptions and David Long checked the English text.

References

Bernhardi, J. J. 1842 ['1841']. *Selectus Sem. Horto Erfurt.* Erfurt. [not seen].

Brückner, C. 1985. Zur Samenmorphologie in *Corydalis* Vent. (Fumariaceae DC.). *Gleditschia* **13**: 53–61.

Candolle, A. P. de 1821. *Regni vegetabilis systema naturale* **2**. Paris.

—— 1824. *Prodromus systematis naturalis regni vegetabilis* **1**. Paris.

Dobremez, J. F. et al. 1972. *Bibliographie de Nepal.* Paris.

Edgeworth, M. P. 1851. Descriptions of some unpublished species of plants from north-western India. *Trans. Linn. Soc. Lond.* **20**: 23–91.

Endlicher, S. L. 1850. *Genera plantarum* suppl. 5. Wien.

Fedde, F. F. 1914. Ein Lerchensporn mit köpfchenförmigem Blütenstande aus SW-Tibet (*Corydalis Schlagintweitii* spec. nov.). *Reprium Spec. nov. Regni veg.* **13**: 303–304.

—— 1919. *Corydalis schlechteriana* und *C. pseudoschlechteriana* spec. nov. aus dem Verwandschaft der *C. curviflora* Maxim. *Reprium Spec. nov. Regni veg.* **16**: 197–199.

—— 1920. *Corydalis longipes* et *C. casimiriana* varietatibus novis auctae. *Reprium Spec. nov. Regni veg.* **16**: 314–315.

—— 1921. *Corydalis sikkimensis* (Prain) Fedde spec. nov., sowie zwei neue Varietäten aus Kaschmir. *Reprium Spec. nov. Regni veg.* **17**: 201.

—— 1922. Neue Arten von *Corydalis* aus den Himalaya und den angrenzenden Teilen von Tibet. I. *Reprium Spec. nov. Regni veg.* **18**: 29–30.

—— 1923. Neue Arten von *Corydalis* aus den Himalaya und den angrenzenden Teilen von Tibet. II. *Reprium Spec. nov. Regni veg.* **19**: 119.

—— 1928. *Corydalis denticulatobracteata* spec. nov. aus Sikkim. *Reprium Spec. nov. Regni veg.* **25**: 219.

—— 1936. Papaveraceae. *In* A. Engler & K. Prantl (Eds), *Die natürlichen Pflanzenfamilien*, 2nd ed., **17b**: 5–145. Leipzig.

Fischer, C. E. C. & Kaul, K. N. 1940. New species and records from Tibet. *Kew Bull.* **1940**: 266–269.

Franchet, A. 1886. Plantas yunnanenses. I. *Bull. Soc. bot. Fr.* **33**: 359–467.

Hara, H. (Ed.) 1966. *The flora of eastern Himalaya.* Tokyo.

——, **Chater, A. O. & Williams, L. H. J.** 1982. *An enumeration of the flowering plants of Nepal* **3**. London.

——, **Stearn, W. T. & Williams, L. H. J.** 1978. *An enumeration of the flowering plants of Nepal* **1**. London.

—— **& Williams, L. H. J.** 1979. *An enumeration of the flowering plants of Nepal* **2**. London.

Hemsley, W. B. 1984. Enumeration of the plants collected by Mr. Thorold. *J. Linn. Soc.* (Bot.) **30**: 107–123.

Hooker, J. D. & Thomson, T. 1855. *Flora Indica* **1** (*Corydalis* pp. 258–272). London.

Jafri, S. M. H. 1974. No. 73. Fumariaceae, *Flora of West Pakistan*, Rawalpindi.

Kitamura, S. 1955. New species from Nepal collected by Sasuke Nakao, a member of the Japanese Himalayan Expedition IV. *Acta phytotax. geobot. Kyoto* **16**: 2–4.

Klotzsch, J. F. & Garcke, C. A. F. 1862. *Bot. Ergebn. Reise Waldemar.* Berlin.

Lamarck, J. B. de & Candolle, A. P. de 1805. *Flore Française* ed. 3. **4**. Paris.

Long, D. G. 1984. Notes relating to the flora of Bhutan IX. *Notes R. bot. Gdn Edinb.* **42**: 87–106.

Ludlow, F. G. 1975. *Corydalis brevicalcarata*, a new species from Nepal. *Bull. Br. Mus. nat. Hist.* (Bot.) **5**: 287.

—— **& Stearn, W. T.** 1975. New Himalayan and Tibetan species of *Corydalis*. *Bull. Br. Mus. nat. Hist.* (Bot.) **5**: 45–69.

Maximowicz, C. J. 1889. Flora tangutica. *In: Historia naturalis itinerum N. M. Przewalski per Asiam centralem. Pars Botanica* **1**. Petropolis.

Michalkova, M. 1981. Subsectionis *Strictae* (Fedde) Fedde generis *Corydalis* Vent. (Fumariaceae) revisio critica. *Nov. Sist. Vysshikh Rast.* **18**: 191–196.
—— 1982. De generis *Corydalis* Vent. (Fumariaceae) speciebus nonnullis ex Asia media. *Nov. Sist. Vysshikh Rast.* **19**: 81–98.
Mukerjee, S. K. 1973. Fumariaceae. *Rec. bot. Surv. India* **20**(2): 32–33.
Ownbey, G. 1947. Monograph of the North American species of *Corydalis*. *Ann. Mo. bot. Gdn* **34**: 187–260.
Popov, M. G. 1937. Papaveraceae. *In* V. A. Komarov (Ed.), *Flora USSR* **7**. Moskva.
Prain, D. 1896. Noviciæ Indicæ X. Some additional Fumariaceæ. *J. Asiat. Soc. Beng.* II, **65**(2): 10–41.
Royle, J. F. 1833. *Illustrations of the botany of the Himalayan mountains* **2**. London.
Spach, E. 1839. *Histoire naturelles de Vegetaux* **7**. Paris.
Stainton, J. D. A. 1972. *Forests of Nepal*. London.
Su, Z. Y. 1986. Sect. *Hamatae*, one new section of *Corydalis* from China. *Acta Bot. Yunnanica* **8**: 407–412.
Wallich, K. 1826. *Tentamen flora napalensis*. Calcutta.
Wendelbo, P. 1974. No. 110. Fumariaceae. *In* K. H. Rechinger (Ed.), *Flora Iranica*. Graz.
Wu, C. Y. & Chuang, H. 1982. *Corydalis* sect. *Oreocapnos* Popov in China. *Acta Bot. Yunnanica* **4**: 1–6.
—— —— 1984. Study of *Corydalis* sect. *Rapiferae* Fedde. *Acta Bot. Yunnanica* **6**: 237–265.
—— **& Shu, T. Y.** 1980. New species of *Corydalis* sect. *Mucroniferae* from Yunnan. *Acta Bot. Yunnanica* **2**: 202–212.

Index

Accepted names are in roman and synonyms in *italic*; new names and principal references are in **bold**. An asterisk (*) denotes a figure.

alburyi Ludlow 499
sect. Asterostigmata (Fedde) Fedde 480, **534**
astragalina Hook. f. & Thomson 535

borii C. Fischer 521, 523
brevicalcarata Ludlow 534, 536

calycina Lidén 479, 480, 481, 483, 514*, 515*, 517 (map), 529, **532**
sect. Capnogorium (Bernh.) Endlicher 480, **496**, 523
cashmeriana Royle 481, 482, 484, 485*, **486** (map), 488, 489*, 536
cashmeriana subsp. *brevicornu* (Prain) D. Long 487
cashmeriana var. *brevicornu* Prain 487
cashmeriana var. *ecristata* Prain 487
casimirana Prain 481, 483, 514*, 515*, 526 (map), 529, 532, **533**
cavei D. G. Long 481, 483, 511*, 513*, 517 (map), **529**, 530
chaerophylla DC. 481, 483, 495 (map), 504*, 505*, **521**, 522, 534
chaerophylla var. *geraniifolia* (Hook. f. & Thomson) Hara 522, 523
chasmophila Ludlow 518
sect. *Chremnocapnos* Wendelbo 534
clavibracteata Ludlow 480, 483, 507*, 509 (map), 524, **525**
conspersa Maxim 480, 482, 494 (map), **495**, 501*, 502*
cornuta Royle 481, 484, 511*, 512*, 516 (map), **528**
crispa Prain 529

denticulatobracteata Fedde 526, 536
diphylla Wallich 480, 482, **484**, 485*, 494 (map), 519*
duthiei var. *sikkimensis* Prain 508

ecristata (Prain) D. G. Long 481, 485*, 486 (map), **487**, 489*
ecristata var. *longicalcarata* D. Long 486
elegans Hook. f. & Thomson 480, 483, 494 (map), 500*, 501*, **518**
elegans subsp. elegans 480, 494 (map), 500*, 501*, **518**
elegans subsp. **robusta** Lidén 479, 480, 494 (map), 500*, 501*, **518**
sect. Fasciculatae Maxim. 480, **484**

filicina Prain 481, 483, 511*, 513*, 517 (map), **529**, 530
filiformis Royle 483, 514*, 515*, 517 (map), **530**, 532
flabellata Edgew. 480, 482, 523*, 527 (map), 531*, 534, **535**
sect. *Flabellatae* Michalkova 534
flaccida Hook. f. & Thomson 481, 482, 519*, **523***, 526 (map)

geraniifolia Hook. f. & Thomson 481, 483, 505*, 506*, 508 (map), 521, **522**
gerdae Fedde 499
govaniana Wallich 481, 482, 483, 491 (map), 498*, 500*, **514**, 516, 517
gracilis Franchet 533
graminea Prain 490

hamata Franchet 494, 495
sect. Hamatae Wu & Su 480, **494**
hendersonii Hemsley 480, 481, 483, 507*, 510*, **525**, 527 (map)
hoffmeisteri Klotzsch 503
hookeri Prain 480, 481, 484, 511*, 512*, 516 (map), **526**, 528

juncea Wallich 481, 482, 487 (map), **488**, 492*, 493*

lathyroides Prain 481, 482, 483, 509 (map), 513*, 514*, 530, **534**
latiflora Hook. f. & Thomson 481, 482, 490 (map), 497*, 498*, **499**, 524
sect. Leonticoides DC. 480, **484**
leptocarpa Hook. f. & Thomson 481, 482, 523*, 527 (map), 531*, **534**
longipes DC. 480, 483, 514*, 515*, 517 (map), 529, **530**, 532, 533, 536
longipes var. *burkilli* Fedde 532
longipes var. *phallutiana* Fedde 532
longipes var. *smithii* Fedde 532
lowndesii Lidén 479, 480, 482, 487 (map), **491**, 493*, 496*

megacalyx Ludlow 480, 481, 483, 507*, 508 (map), 510*, **524**, 525
meifolia Wallich 481, 482, 491 (map), 498*, 499*, **507**, 509
meifolia var. *sikkimensis* Prain 507, 508
mitae Kitamura 499
mucronifera Maxim. 524
sect. **Mucroniferae** Fedde ex Lidén 479, 480, 496, **524**, 537
murreana Jafri 484

nana Royle 480, 481, 482, 490 (map), 497*, 498*, **503**, 524
nana var. *jacquemontii* Fedde 505
nepalensis Kitamura 525
nobilis (L.) Pers. 496
sect. Oocapnos Popov ex Wendelbo 496
sect. *Oreocapnos* Popov 484, 537

pachypoda (Franchet) Hand.-Mazz. 517
pakistanica Jafri 520
polygalina Hook. f. & Thomson 481, 482, 487 (map), **490**, 493*, 496*
polygalina var. *micrantha* Wu 493
prainiana Kanodia & Mukerjee 533
pseudojuncea Ludlow 480, 482, 486 (map), **488**, 492*, 493*
pseudolongipes Lidén 479, 481, 483, 514*, 515*, 517 (map), **532**, 533

ramosa Wallich ex. Hook. f. & Thomson 528
ramosa var. *vaginans* (Royle) Hook. f. & Thomson 528
sect. Ramoso-sibiricae Fedde ex Wendelbo 480, 496, **525**
sect. *Rapiferae* Fedde 484, 537
rupestris Boiss. 534
rutifolia auct. 484

schlagintweitii Fedde 535
shakyae Lidén 479, 480, 483, 495 (map), 501*, 502*, **519**
sikkimensis (Prain) Fedde 481, 482, 494 (map), 498*, 499*, **508**, 536
simplex Lidén 479, 480, 483, 494 (map), 498*, 500*, **514**
spicata Lidén 479, 480, 484, 511*, 512*, 516 (map), **528**
staintonii Ludlow 481, 483, 495 (map), 501*, 502*, **518**
stipulata Lidén 479, 480, 483, 505*, 506*, 508 (map), 521, **522**
stracheyi Prain 481, 482, 490 (map), 497*, 498*, **505**, 528
stricta DC. 480, 482, 523*, 527 (map), 531*, 534, **535**
sect. Strictae (Fedde) Wendelbo 470, **534**
swatensis Kitamura 517
sykesii Ludlow 518

temulifolia Franchet 534
terracina Lidén 479, 480, 481, 483, 504*, 505*, 508 (map), 521, **522**, 534
thyrsiflora Prain 520
tibetica var. *pachypoda* Franchet 517
trachycarpa Maxim. 484
sect. *Trachycarpae* (Fedde) Fedde 484
trifoliata Franchet 481, 482, **484**, 485*, 486 (map), 496*
trifoliata Franchet 484

uncinata Lidén 479, 480, 481, 483, 503*, 509 (map), 511*, **520**, 521
uncinatella Lidén 479, 480, 483, 503*, 509 (map), 511*, **520**

vaginans Royle 480, 484, 511*, 512*, 516 (map), 525, **528**
verticillata DC. 484

British Museum (Natural History)

MACROLICHENS OF EAST AFRICA

T. D. V. Swinscow and H. Krog

Dr Swinscow was formerly Deputy Editor of the British Medical Journal.
Dr Krog is Professor of Taxonomic Botany at the University of Oslo.

This book is based mainly on collections made in the field by the authors. It covers 77 genera and 629 species. It is the first substantial study of a tropical lichen flora to be undertaken by modern research methods. Thin-layer chromatography has been used throughout, and the great majority of species have been studied by microscopic examination of microtome sections. The nomenclature has been thoroughly revised, and in all cases the basionym is given. The book will be indispensable to students of the lichens of the African continent and valuable to readers interested in lichens throughout the tropics.

June 1988, viii + 384pp, 185 figs., 16pp colour illustrations.
Hardback. 0 565 01039 5. £20.00.

Titles to be published in Volume 18

An illustrated catalogue of the type specimens in the Greville diatom herbarium
By David M. Williams

Erik Acharius and his influence on English lichenology
By David J. Galloway

Seaweeds of the western coast of tropical Africa and adjacent islands: a critical assessment. IV. Rhodophyta (Florideae) 2. Genera G
By James H. Price, David M. John and George W. Lawson

Some Cretaceous and Palaeogene *Trinacria* (diatom) species
By Patricia A. Sims and Robert Ross

A monograph of *Dryopteris* (Pteridophyta: Dryopteridaceae) in the Indian subcontinent
By Christopher R. Fraser-Jenkins

***Corydalis* (Papaveraceae: Fumarioideae) in Nepal**
By Magnus Lidén

Typeset by Waveney Typesetters, Norwich, Norfolk
Printed in Great Britain by Henry Ling Ltd., Dorchester